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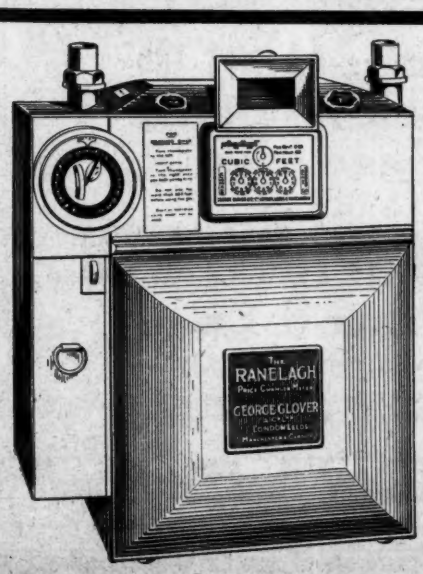

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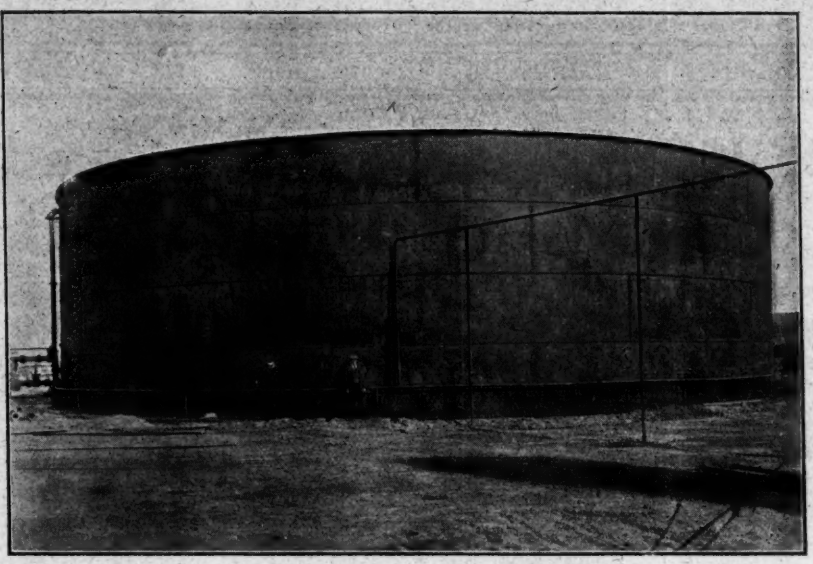

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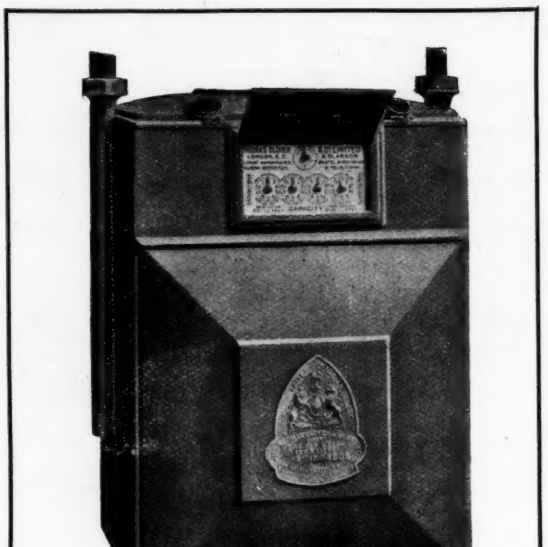

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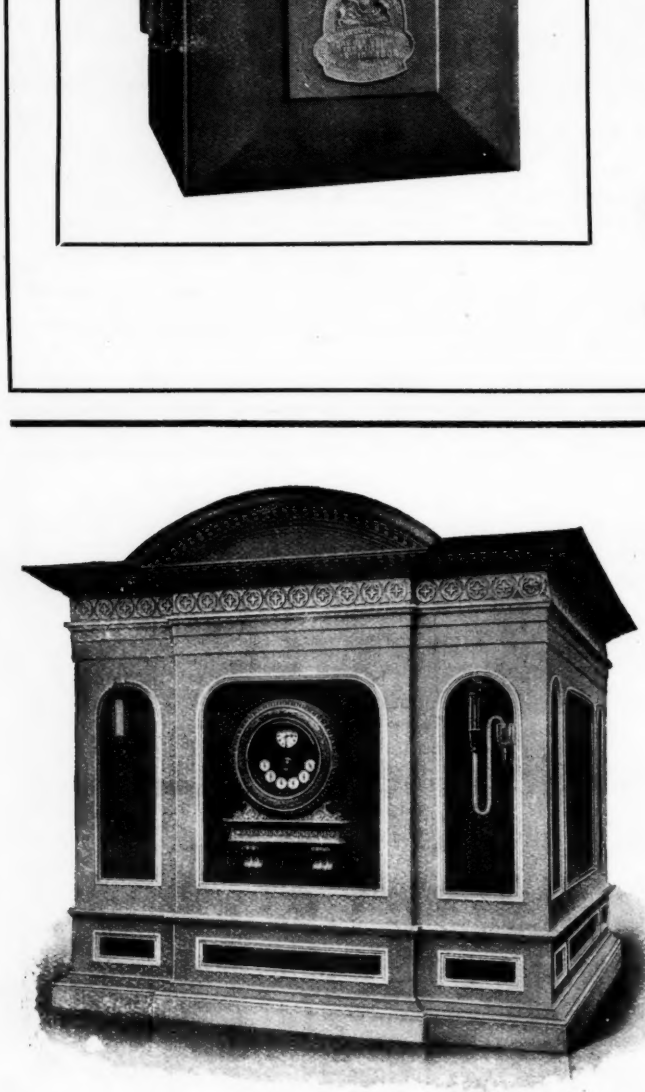

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EDITORIAL NOTES.

Factory Lighting Committee's Non Possumus.

THE Home Office Committee, sitting under the Chairmanship of Sir Richard Glazebrook, and dealing with the question of adequate and suitable lighting for factories and workshops, have issued another report. It is the third ; but really it does not carry us much further than those that have preceded it. The work of the Committee should, from the point of view of guidance, have a beneficial effect ; but we are afraid it will not go beyond that. One thing we miss from the reports is a recognition that the two main sources of artificial illumination that compete for the business of factory and workshop lighting are not physically the same. The Committee appear to have treated them as though in their physical attributes they are on an equality. From this we distinctly dissent. We made the point on the issue of the second report ; and, as there is no modification of the position then taken up by the Committee, we repeat the protest. If the Committee were out to do their work thoroughly, then they should surely have discriminated, in making their recommendations, between certain of the physical characteristics of the two sources of light. The reference to them includes consideration of the nature of the work carried on, and "the protection of the eyesight "of the workers." But no distinction is made by them between electric lights of high intrinsic brilliance and low-pressure incandescent mantles that have an intrinsic brilliance far removed in point of lowness from the modern forms of electric lamps. Knowing this, the Committee should have recognized it, having regard to "the protection "of the eyesight of the workers." Instead, in the second report, they proposed that every light source (except one of low brightness), under certain conditions, should be shaded so that no part of a filament, mantle, or flame is distinguishable through the shade, unless placed at certain specified angles. "Low brightness" was defined as meaning an intrinsic brilliance of no more than 5 candles per square inch. This is absurd when one comes to think of the great distinction there is between the intrinsic brilliance of a low-pressure incandescent mantle and a modern electric lamp. There is no reason whatever why a low-pressure mantle should be obliterated by the surrounding shade or globe to the same complete degree as the filament of an electric lamp. There should therefore be exemption from this proposal for light sources of such comparatively low intrinsic brilliance as ordinary incandescent mantles, whatever may be thought of high-pressure ones ; but the low figure of 5 candles per square inch—exempting oil-lamps, flat-flame gas-burners, and candles!—has obviously been prescribed so as to exclude from exemption a source of light that has infinitely greater merit so far as prevention of injury to eyesight goes than electric lamps of high intrinsic brilliance. There is not a single member of the Committee directly identified with the gas industry. It is true the Chairman is now the Chief Gas Examiner ; but he was not at the time the previous reports were issued.

Of course, adequate and suitable lighting is an imperative need of all factories and workshops, and for several material reasons ; but unless power is vested in the Home Secretary to enforce the provision of such lighting, there will continue to be many lapses from prescription or actual need. Having got so far as they did in the first and second reports, the Committee found themselves in their present circumstances up against something impregnable. In the third part of their investigation, they have devoted attention mainly to the classification of industrial processes according to the illumination required for carrying on the work ; but, unaided, they have failed. The obstacles to classification and prescription are too many ; and a long, tedious, and highly discriminating investigation is needed before anything positive can be done, and then it would have to be with the help of the industries concerned. The whole subject is intricate and complex. No two industries are precisely the same in the nature of their lighting needs ; and the work of an industry may be so varied that each process in it requires special research before there can be determination of requirement. The Committee do not say this cannot be done—given time, facilities, and the wherewithal for carrying on the work ; but at the moment they confess that they are completely incapable, without assistance, of making progress to more definite ends. However, they have tried—and we agree that this is the best plan for securing advance—to get on to a general basis.

In work of this kind it is better not to try to reach the end by short cuts. So, initially, the Committee have thought it possible—and correctly, we think—that most of the chief processes might be classified in a limited number of groups according to the illumination needed, thus bringing the whole investigation within manageable dimensions. Then, dealing with the question of adequacy, two alternative courses present themselves : (1) Definite minima may be laid down below which illumination on any part of the working plane must not fall ; (2) standards of illumination may be specified as recommended practice, to serve as guides in determining whether lighting is adequate. From the investigation made, and the information available, the Committee have come to the conclusion that at present there can be no enforcement of legal minima of illumination for industrial purposes. No one expected the Committee would be able directly to achieve so much that this could be done ; and even if, as the result of prolonged and detailed inquiry, the Committee were able to prescribe definite minima for all processes, we are wondering what practical machinery they would be able to evolve which could ensure that with those minima there was strict compliance. It would be a costly matter to keep an army of inspectors making spot tests after dark in every factory and workshop in the country. Recognizing their inability to specify definite and legal minima, the Committee have specified standards of illumination as "recommended practice" for "fine" and "very fine" work. In Appendix I., there are scheduled a number of industries, in which it is recommended that the illumination shall not for "fine" work fall below 3 foot-candles, and for "very fine" work 5 foot-candles. Who are to be the judges as to what is "fine" and "very fine" work ? Judgment would be important, inasmuch as between the "fine" and "very fine" work the prescription allows a difference of 2 foot-candles. Save for the guidance that the reports give to those who choose to profit by it, we are afraid the inquiry has only produced a negative result, although apparently nearly £1000 has already been spent upon it.

It seems that the Committee look upon this as the conclusion of their work, unless something can be done to render them help in attempting to accomplish what a centralized committee cannot do single-handed. In other words, it was too big a task ; and the available resources were insufficient. Obviously a roving commission and plenary powers and funds are, in the estimation of the Committee, necessary for a piece of work having as its objective prescription of infinitesimal character for a myriad of processes and classes of work, which prescription after all would be vitiated by the long range of differences in

eyesight up and down from average or normal. However, it seems that the Committee hope the work will proceed to more definite conclusions, ambitious and superfluous though some of it be. From our own point of view, we think that general prescriptions are all that can be hoped for, and all that are necessary, and that the regulation of factory lighting need not be established on a basis of definite legal minima of illumination varying for all classes of work. We do agree, however, that there should be powers to enforce a sufficiency of light. The goal the Committee have in mind is something more exact than that. This is shown in various places in the report—in one, by the remark that regulation on the basis of definite legal minima should be preceded by a careful and systematic inquiry conducted on two main lines: (1) "The collection, for every process concerned, of a sufficient number of observations to give some indication of the best existing practice; (2) experimental research with the object of discovering the conditions of illumination desirable on physiological and psychological grounds." But the Committee point out that little real progress can be expected so long as the whole onus of the work rests on a centralized Committee; and it seems to them not unreasonable to expect active co-operation on the part of all the principal industries in which lighting is specially important. It is therefore suggested that the chief of the industries specified in Appendix I. of the report should be invited to assume partial responsibility for the scheme by arranging for the collection of actual data, possibly through the Research Associations where they exist. The data would afford an indication of existing practice, and would, it is thought, form a valuable complement to the more fundamental problem—which should remain under the immediate control of the Committee—of experimental research into the conditions of illumination desirable on physiological and psychological grounds. We admit freely the importance to industry of adequate and suitable lighting. It affects man and works efficiency, and it is protective in many ways. But we are afraid that industry does not view the matter through the same spectacles as certain members of the Committee who have great ideals in this regard, and that industry will be hard to move in the direction of co-operation. We have seen little actual evidence of any industrial interest in the work the Committee have so far been doing. Speaking generally, industry is not particularly well disposed to official control of the pragmatic order; and we cannot see it voluntarily doing much to help manufacture it.

Where the Gas Lighting Load is Almost Extinct.

THERE was a paper and discussion at the annual meeting of the Institution of Gas Engineers, on the subject of the best means of maintaining and increasing the lighting load. Neglect in the gas industry has to this branch of the business done more damage than competition; it has undoubtedly put a large amount of lighting business into the hands of the suppliers of electricity. The subject at the meeting was introduced by Dr. Carpenter in a paper which it is hoped carried home many truths, and will have a beneficent effect. Everybody agrees as to the importance of obtaining and retaining as large a lighting load as possible. It comes at a period of the day when the load is small for other domestic and industrial purposes. No one will therefore dispute that its retention is highly desirable. But curiously, almost coincident with the reading of the paper by Dr. Carpenter, we have had brought to notice gas undertakings that have practically no lighting load owing to the low price of electric current, and yet are obtaining luxuriant increases of business from cooking, heating, and industry.

In later columns of this issue there is an account of the progress that is being made by the gas undertaking at Vancouver. The information was obtained from Mr. John Keillor, the Engineer and Manager of the works, who is on a visit to this country. In passing, we should like heartily to congratulate him upon the progress of the business of the concern, upon the modern character of his plant, and upon the fact that he works under regulations that have been framed by a Government who are highly progressive in gas matters. They require a supply of 450 B.Th.U. minimum; and the citizens are to-day furnished with gas of 460 B.Th.U. Now in Vancouver, so far as lighting goes, gas is used merely for emergency purposes, owing to the low cost of electricity. Nevertheless, Mr. Keillor has nothing about which to complain, seeing that in six years his consumption for cooking, heating, and industrial purposes has increased by no less than 136 p.ct. The make in 1916 was 254 million cubic feet; and estimating on the sales so far this year, it is calculated that in the twelve months the consumption will reach 600 million cubic feet. That is a tremendous flight in six years, and with no lighting load! It tells a very satisfactory tale.

Montevideo is another place where the Company have lost practically all the lighting load; and yet, at the annual meetings, the Chairman (Mr. Charles Hunt) has to report increase upon increase in the consumption. Only in May last he was telling the shareholders that the capacity for growth in sales for cooking, heating, and industrial purposes seems practically unlimited. The additional consumption last year was almost double that of the previous year, when it was 7·75 p.ct. And Mr. Hunt was able to report that the higher rate continues to be fairly well maintained. At the meeting a year before, he spoke of the steadily improving results for cooking and heating in the outlying districts, also of the practical loss of the lighting load, despite which the increase in consumption since 1914 had been rather more than 35 p.ct. There is Llandrindod Wells, where we believe the Gas Company have one lighting consumer, and that a stores. The reason for this is that the electricity supply was well established before gas was introduced. Though electricity was in possession of lighting, the Gas Company, on cooking, heating, and industrial consumption, are paying a 5 p.ct. dividend. These are highly interesting experiences, and are not without their value in the testimony they bear to the potentiality of the gas business.

The Gas-Cooker Oven.

THE deeper the penetration into the report of the National Gas Council Standardization Committee on Cookers, the more satisfied are we that the object in view has received a very detailed survey. There has been nothing superficial about the work; and therefore all who took part in it deserve the warmest recognition on the part of the gas industry. The section of the report which deals with oven construction is published by us to-day; and then there remains the specification. At the present stage the Committee, in our opinion, did well to discard novel proposals in the way of new construction, as, if anything is to issue from this work, then it is better not to delay standardization for anything that must, until experience tells its tale, be more or less speculative. The lines they have pursued are all of a practical order. They have not only considered efficiency and initial and maintenance costs, but each aspect of the subject has been regarded from the public point of view. But it would be a mistake to condemn innovation on the ground that it is opposed to a practice of cooker users, if the innovation meets a claim that a section of the public makes. For example, many cooker users do their regulation by observation of the length of the gas-flames; and therefore it is considered unwise to introduce enclosed flames either in the centre at the base of ovens or at the sides. We are afraid that, with the changes that have been made in gas composition and calorific value, judgment on flame length has had to be considerably revised. However, if there are merits in external heating that overcome (say) prejudice, then external heating should not be discarded—at any rate as an auxiliary; and surely it is not beyond the scope of invention to make flames visible when situated at the sides of the oven. But other objections to external heating are presented. The cost of maintenance is said to be greater, extra cleaning is involved, and there is possible risk to the user. On these various grounds, the Sub-Committee resolved not to recommend ovens in which the flames are not fully exposed.

There are three outstanding subjects treated upon in the part of the report bearing upon oven construction and efficiency. The first is that of packing; the second, linings; and the third, ventilation. The first and third have between them an appreciable bearing upon economy and efficiency. Slagwool and sheet asbestos have, the Committee's experiments assure them, nothing much in superiority one over the other to cause a balance of preference for one or the other. They are about equal in efficiency, though there is a little tendency to favour slagwool. The Committee do not, however, recommend anything more than the packing of the doors in the smaller sizes of ovens, as they do not consider the initial outlay of packing the sides would be justified. It is suggested that 10 p.ct. would be the average saving in

consumption due to the slagwool method, provided the joints of the oven are perfectly tight. The 10 p.ct. refers to the consumption not of the whole cooker, but of the oven only. The Committee (the members of which have considerable and varied experience) allocate as fair average proportional figures 20 p.ct. of the total consumption of the cooker to the oven, and 80 p.ct. to the hot-plate. The 10 p.ct. of the 20 p.ct. would, therefore, mean only 2 p.ct. of the total cooker consumption. In larger cookers, and where the ovens are used extensively, the question of heat insulation has to be regarded differently; but as to small size cookers the difference in initial cost, other than in respect of the oven-doors, would not justify the costs involved in providing packing. Regarding the top of the oven, it is noticed that the Committee suggest that a products chamber might be formed by the insertion of a single sheet of metal; and this would be economical and satisfactory. Reverting to the 80 p.ct. consumption for the hot-plates and 20 p.ct. for the ovens, these are figures that should be marked by our electrical competitors, who say so much about the efficiency of their ovens, and so little about that of their hot-plates. When they consider the relative extent of use, and the initial inefficiency and declining efficiency of their hot-plate elements, they may see that the argument as to the efficiency of the oven portion of an electric-cooker can be pushed too far. There is an offset of no mean order.

The next point is as to linings. The Committee speak highly of aluminium linings, which have advantages over enamelled steel ones. These advantages are set forth in the report. If neglected, enamelled steel linings soon become an eyesore. But care has to be taken in the application and use of aluminium linings. The Committee make a special point of this. It is, of course, necessary to remove them when the cookers are returned from the district for cleaning and repair, as in passing them through the muffles, at the temperatures at which they are sometimes worked, the linings would melt. The aluminium, too, must be of a high degree of purity—98 to 99 p.ct.—as anything above 2 p.ct. of impurities would, in the circumstances of use, shorten life considerably. There need be no fear as to impurities having a detrimental effect on food; but they have a large bearing upon the power of the plate to resist corrosion, when exposed to acids and alkalies. The impurities appear to accelerate corrosion in two ways —viz., by auto-electrolysis, and by forming porous cavities in the material into which the alkali penetrates, setting-up interna corrosion until it is neutralized. Therefore, if aluminium is employed, care has to be taken in its selection. Given that care, the linings should have an excellent life; and the aluminium sheets can always, when removed from the larger cookers on repairs being effected, be cut-down for smaller cookers.

In passing, it is noticed that the Committee are not enamoured of drop doors for ovens, on account of the loss of heat that they occasion. In their opinion, swing-doors on hinges hold the field for utility. Loss of heat and oven ventilation go together, although, the proportion of gas used in the oven being so small, the loss of heat from the oven must be moderate relative to that from the 80 p.ct. of the total consumption by the hot-plate. It has been proved over and over again that there is a great deal too much excess of air passing through the ovens of the majority of cookers when in action; and the results of tests offer at least a very good reason for controlling outlets automatically, if it can be done without setting-up smothering troubles. Of course, there must be some excess of air over the requirement for combustion; but the lower this can be brought the better, as the more air that passes through the oven, the greater the quantity of heat that is carried away. When the oven is in use, the food causes an obstruction to the excess air, and the steam evolved from the food also has a reducing effect upon the excess air. Then again, a consumption at the rate of 30 c.ft. of gas per hour when starting-up an oven would be brought down probably to 12 c.ft. for temperature-maintenance purposes. These are all conditions—especially the last-named—which have to be taken into account in considering any modifications of the size of the flue-outlet.

Experiments were made by the Committee to determine the volume of air passing through a gas-oven when in ordinary use. The results are set out in tabular form in later columns; and therefore it is sufficient here to mention the Committee's deductions. On first glance, it may appear singular, but on consideration it will not be, that the percentage excess of air was greater at the lower consumptions than at the higher; and not only was this the case, but in some of the tests the actual volume of excess air also increased. The tests likewise show that, as the area of the flue-outlets was reduced, there was a material diminution of the excess air. This is an important point in connection with oven efficiency. Figures in the report testify to the considerable heat loss there is consequent on the super-saturation by air of the products of combustion at the lower consumptions. Another interesting table demonstrates how much better the temperature in the oven is maintained by reducing the flue aperture. The figures given range from a period of 45 minutes from the start to 135 minutes—the consumption of gas being at the rate of 30 c.ft. at the start, and reduced after 45 minutes to 12 c.ft. per hour. The temperature of the oven was consistently higher with the reduced flue aperture. With full flue aperture, it was 545° Fahr. at 45 minutes, and 350° at 135 minutes. With reduced flue aperture, the corresponding figures were 585° and 405°. Therefore, the increase of temperature due to the reduced flue area was about 15 p.ct. This is an economy worth securing in the permanent interests of consumers, notwithstanding that the oven consumption is only 20 p.ct. of the total. However, the experiments of the Committee led them to the conclusion—though there is nothing definite advanced on the subject—that, if the flue aperture is such as to allow three times the volume of air actually needed by the gas to pass into the oven, the oven will be both satisfactory and safe. This will allow an aeration of the products of combustion to the extent of 200 p.ct.; and, while this is not excessive, it allows a margin for the reduction that must inevitably take place when the cooker has been in use for some time. This is a useful practical point; and it is interesting to learn that many cookers fulfil very nearly these requirements at maximum consumption. Damper regulation of oven-outlets when intelligently operated, it is pointed out, will result in economies of 10 to 12 p.ct. The damper system recommended by the Committee is the damper blade, or "butterfly," operated in conjunction with the gas-tap; but, where a damper-rod is used, they urge, to prevent interference by children, the use of some simple form of locking-tap.

To sum-up the economy to be achieved by the combined use of flue-dampers and slagwool-packed ovens, it is between 5 and 10 p.ct. of the—mark this—total cooker consumption, as compared with one not equipped with either of these features. Where an oven is frequently used, this is a highly important saving.

"N.A.T.G.O." and a Financial Burden.

In our Institution number, there appeared a report of the proceedings at the meeting of the National Association of Technical Gas Officials. The report was practically a confession that the difficulties that opposed the good cause in hand had been greater than at the present time could be surmounted; and therefore operations have been temporarily suspended. In our "Correspondence" columns to-day, Mr. R. G. Shadbolt and Mr. F. C. Briggs appeal to the members of the Association to help lift the financial burden resting upon the Executive Committee. They ask for immediate payment of the current year's subscriptions, in order that outstanding debts, contracted on the members' behalf, and consisting largely of rents, rates, and salary due to the Secretary, may be liquidated. We are sure the members will readily comply, in order that the Executive may be relieved of an obligation which their voluntary work has brought upon them.

Gas Coal Position.

The reports from the different coal centres last week were of a totally distinct nature. From Yorkshire, Durham, and Northumberland, a stronger inquiry for gas coal was reported. This was attributed to the demand from abroad and signs of general improvement in trade at home. There were also indications that, in the more northern markets, collieries were inclined to ask somewhat higher prices. The reports from Yorkshire are apparently unreliable in one respect. One represents less of the screened variety of gas coal being available; while another declares that stocks of screened are good. From other areas it is learned that the demand for gas coal continues light. Generally, new contracts are being fixed up, and at prices showing a reduction on the previous contract rates.

Summer Time Bill.

The Summer Time Bill, as amended in Standing Committee, has been read the third time in the House of Commons. The measure, it appears, is to remain in force until the end of 1923, and is then to come up annually for renewal. As to the time which has been fixed, the bulk of the country prefers the period originally proposed in the Bill, which is that which obtains this year; but the agricultural community have been resisting this, on the ground of inconvenience for their work. On second reading of the Bill, the Home Secretary agreed to a curtailment of the period. It has been decided that it shall run in future from the day following the third Saturday in April, or if this is Easter Day, the day following the second Saturday in April, until the day following the third Saturday in September. Several local authorities—the London County Council among them—and various organizations have expressed dissent from the shortening change that has been made.

Moisture in Coke.

Coke is receiving a large amount of attention at the present time, all with the view of improving its quality, usefulness, and efficiency. We have recently had the results of the notable work of Sir George Beilby and the staff at the Fuel Research Station, and prior to that the work of Sutcliffe and Evans, Dr. Lessing, E. V. Evans, and others [see "JOURNAL" for June 7 and 14]. In the "Iron and Coal Trades Review" for June 30, Mr. Arthur Grounds, B.Sc., describes the methods he favours for the analysis of coke. Those who are interested will probably obtain a copy of our contemporary. Among general matters he shows how important is the question of moisture in coke, and the bad effects of an excessive content. Mr. W. C. Gillhausen has calculated that the extra consumption of coke per 100 tons of pig iron amounts to 450 kilos per charge (0·443 ton) for every 1 p.ct. increase in moisture, taking 1·263 tons of coke, containing 11·54 p.ct. of ash and 11·72 p.ct. of moisture, for the production of a ton of pig iron. It has also been shown that the presence of an undue amount of water in coke may lower its crushing strength by as much as 14 p.ct. The attrition loss, due to handling, also enlarges with increasing moisture content; and it is therefore apparent that great care is necessary to arrive at the correct moisture content before making any definite statements concerning the quality of a consignment. It is very essential that a representative sample should be obtained, as the moisture content of the small coke of a truckload may be twelve times as great as that of the large coke. The outer layers of the larger pieces also generally contain more moisture than the inner ones. In a paper by Mr. W. H. George, in the "Journal of the Society of Chemical Industry," 1919, it was shown that the ratio of the moisture in the small coke to that in the large coke may vary between 1·2 and 9·5, while the ratio between the moisture in the outer layer of the large pieces to that in the inside lies between 1·9 and 11·3. It is quite impracticable to guarantee the result of the moisture content determination to 0·1 p.ct., although such figures are often given; but the result should be quoted to 0·5 p.ct., which is sufficiently accurate for most purposes.

The Engineers' War Bonus.

The question of the reduction of the war bonus in the engineering trades has again been the subject of conference between the Engineering Employers' Federation and the various unions in the engineering trades. The employers had requested that a reduction of 16s. 6d. a week should be made to operate from the middle of August. Discussion was carried on at more than one sitting; and the final proposal submitted by the employers was that the 16s. 6d. reduction should be effected in three instalments —5s. 6d. on July 31, 5s. 6d. on Aug. 28, and 5s. 6d. on Sept. 25. The proposal is to be submitted to the members of the different organizations on a uniform ballot paper, returnable not later than the 28th inst.

A Suggested Mining Inquiry.

In the House of Commons last week, there was a debate on the mining industry. The mining industry appears destined to be an everlasting subject of discussion. It has got into a disordered state through the combination of disruptive forces inside and economic conditions outside. Now there are, estimates say, at least 100,000 miners out of employment, many working short time, and a great number only earning very small wages. In the House an inquiry was suggested; but the Government cannot agree to this. An inquiry would only lead to the suggestion of a subsidy; and the miners cannot be expected to be supported by the rest of the country, when practically every industry is suffering from incapacity to keep all its own men at work. To this state of things the coal stoppage last year contributed. If there is an inquiry, it should be into the effect upon costs of the seven-hour day in the coal industry, and charges other than for wages. The seven-hour day, it is declared, has added 2s. 2d. per ton to the costs of coal. The price of coal affects all industries and their productions; and this in turn reacts upon the prosperity of the coal industry. The miners, however, show a strong disinclination to allow economic truths to gain entrance into their minds. Hence part of the muddle, and the persistence in a repressive policy to progress.

Railway Rates.

The railway companies will have no peace until they make a further general reduction in their rates. The Association of British Chambers of Commerce have been writing to them on the subject. The Association seem to think the companies are cutting their own throats as well as those of other people. The way to success, it is argued, is to have the railway lines loaded with traffic; and this will only be attained when rates have been greatly reduced. They have excellent grounds for making appeal not only in present conditions, but in view of certain remarks in 1921 by the then Minister of Transport. Sir Eric Geddes said that the rates charged at the time were abnormally high, and that a great decrease was due. With the depression in trade, the rates, in his opinion, were higher than trade could stand. The Council of the Association fail to understand why a policy of reduction of rates cannot be adopted for the carriage of goods and minerals. They evidently do not regard what has been done by the companies as anything worth much consideration or acknowledgment. They charge the companies, or some of them, with putting by enormous reserves. In the case of ordinary industrial concerns and private traders, reserves have to be used under certain economic conditions, and prices have at times to be reduced even if costs do not justify it. The Association urge that this is the policy that should be pursued by the railway companies in the interests of trade and the country, upon which their own prosperity so largely depends. In another quarter it is asserted that railway rates have been increased by 150 to 160 p.ct. above pre-war figures, and that the reductions that have been made represent only a few pence of this increase.

Increased Carriage of Coal and Coke.

Coal, coke, and patent fuel are in these days important contributors to the revenue of the railway companies. The returns for the first quarter of this year show that while there were reductions in all items, save in "passengers at reduced fares," coal, coke, and patent fuel produced for the companies £50,774,565, or an increase of £8,552,548.

A Smoke Abatement Bill Promised.

The Government are being pressed to promote a Smoke Abatement Bill. The House of Lords do not intend to let the matter slide. Lord Newton was the Chairman of the last Smoke Abatement Committee; and in that capacity, he learned much as to the evils of smoke pollution. Lord Hamilton of Dalzell raised the question again last Monday, and put the pointed inquiry as to when the Government were going to promote a Bill. From Lord Newton it was learned that Sir Alfred Mond had agreed to introduce a Bill, and had asked persons and societies interested to frame the basis of a measure. This has been done; and the draft has been in the possession of the Ministry of Health for a considerable time. It was intimated by the Earl of Onslow that the Government hoped to introduce the Bill at an early date. It was intended to give it a second reading this session, and then it would be discussed and passed next session.

T.N.T.—It was stated last Monday, before the Royal Commission on Awards to Inventors, that during the war the total production of high explosives was 770,000 tons; the cost being £29,000,000.

PERSONAL.

Lieut.-Col. HAROLD W. WOODALL, C.I.E., M.Inst.C.E., has been appointed a Director of the Bournemouth Gas and Water Company, in place of the late Sir Daniel F. Goddard.

Mr. R. C. TAYLOR, who has just taken his B.Sc. degree in Gas Engineering at the University of Leeds, has been appointed Assistant Engineer and Manager of the Bridlington Gas Company. Mr. Taylor was a pupil of the Leeds Modern School, which he left to go for two years to Messrs. Nicholsons' Sulphuric Acid and Chemical Works. After being on active service throughout the war, he went back to these works for a little time, and entered the Department of Coal Gas and Fuel Industries at the University of Leeds for a B.Sc. course in Gas Engineering in 1919. He has had some experience with Mr. J. Kelly, the Engineer and Manager of the Gas-Works at Bridlington, during the University long vacations of 1920 and 1921.

Mr. FRANK S. TOWNEND, B.Sc., has resigned his position as Research Assistant on the staff of the Joint Gas Heating, Lighting, and Ventilation Research Committee of the University of Leeds and the Institution of Gas Engineers, in order to take up the duties of a position on the staff of Sir Arthur Duckham as Technical Engineer. Mr. Townend has been on the research staff for three-and-a-half years, and has taken part in the investigations conducted on the steaming of vertical gas-retorts at Uddingston, the blue water gas process, and the carburetted water gas process at Birmingham. Before joining the research staff, Mr. Townend was serving with the Birmingham Corporation Gas Department.

OBITUARY.

The death occurred on the 8th inst. of Mr. CHARLES WEBB, who had been a Director of the Newport (Isle of Wight) Gas Company since 1912. Deceased was an alderman of the borough, and had twice filled the office of Mayor.

The death took place, on the 7th inst., of Mr. GEORGE PROCTOR J.P., of Thornton-in-Craven, a well-known commercial magnate and financial expert. He owned the gas-works at Earby, and negotiated the sale of the Pernambuco Gas Company.

The death is regretted of Mr. JAMES ANDERSON, who had been an official in the Belfast gas service for over half-a-century, and was employed by the undertaking before it was taken over by the Corporation in 1894. Deceased was in his 77th year, and was a native of Kilmarnock.

Benner Coal-Gas Process.

Two coal-gas benches of the Benner process type which have been erected by the Gas Manufacturing Company, of Montclair (N.Y.), at the Dover (N.J.) Gas-Works are described by Mr. G. H. Wolle in the "Gas Age-Record." The entire bench is above the surface of the ground, and is provided with producer, recuperators, retorts, and hydraulic mains. The producer gas mixes with the heated air from the recuperators, travels along a channel, and burns in the ports, issuing between the retorts. The waste gases pass from the top of the bench down through the recuperator flues, and then to the stack. The gas is taken off at both ends of the through retorts. Each bench contains (in two rows) six silica retorts 12 ft. long, 13 in. wide, and 3 ft. high, with walls 3 in. thick. The top and bottom of the retorts are of circular section. The bench is 11 ft. wide, 12 ft. deep, and 20 ft. high, and is built like the usual coal-gas bench. The retorts are charged from a lorry, from the top, like coke-ovens; and the coal drops from the upper into the lower retort through a vertical channel. The retort will hold 1500 lbs. of coal; and from six to eight hours are needed to carbonize it. While charging, a small door at the top of the mouthpiece is opened, and a mechanical coal-leveller is inserted to distribute the charge. Coke from the finished charge is pushed out mechanically. The coke yield is stated to be 69 p.ct.; and 305 lbs. of the hot coke are used in firing for each ton of coal carbonized. From 12 to 13 gallons of tar per ton are obtained, and from 125,000 to 135,000 c.ft. of gas per bench per day. During five months' operation, there has been no naphthalene trouble nor scurfing. The retorts are maintained at a temperature of 2300° to 2600° Fahr.

There have been published this week the reports for the year 1921 of the Chief Inspector under the Alkali, &c., Works Regulation Act and of the Chief Inspector of Factories and Workshops. These are necessarily held over for notice in our next issue.

Alderman William Poole, J.P., of Boston (Lincs.), twice Mayor, and a member of the Town Council since 1899, who was Chairman of the Boston Gas Company, left estate of the gross value of £13,640, with net personalty £9195. Other wills recently proved include those of Mr. Joseph Watson, a Director of the Rugby Gas Company, who died on April 24, aged 83, and left estate of the gross value of £172,914, with net personalty £127,604; and of Mr. Francis George Nalborough, a Director of the Harwich Gas Company, who died on March 25, aged 48, and left estate valued at £427.

UNIVERSITY OF LEEDS.

GAS RESEARCH FELLOWSHIP.

A Gas Research Fellowship, value £200 per annum, established by the Institution of Gas Engineers at the University of Leeds for the prosecution of post-graduate research in gas chemistry, has been awarded to Mr. STUART PEXTON, M.Sc. (Leeds).

Mr. Pexton, who was a pupil at the Huddersfield Secondary School, and subsequently attended the Huddersfield Technical College, from which he entered the University, took his B.Sc. degree in 1920 as a student of the Chemical Department; his course having been interrupted for a little time by service with the Artists Rifles. For the last two years he has studied entirely in the Department of Coal Gas and Fuel Industries, and took his Diploma in Gas Engineering in 1921. In June, 1922, Mr. Pexton presented a thesis on research work with which he had been occupied in the laboratories of the Department, and was awarded the B.Sc. degree with First Class Honours in Gas Engineering.

Mr. Pexton succeeds Dr. A. C. Monkhouse in his tenure of the Fellowship.

CORBET WOODALL SCHOLARSHIP.

This Scholarship, tenable at the University of Leeds for three (or four) years, and endowed in 1915 by the late Sir Corbet Woodall through the Institution of Gas Engineers, has been awarded to Mr. WILLIAM H. B. HALL, at present engaged in the Physical Laboratories of the South Metropolitan Gas Company.

Mr. Hall received his school training at the Harpur Trust Boys' School and the Elstow School, Bedford. He served in the Royal Naval Air Service and Royal Air Force in France, Africa, and the North Sea, from 1915 until the end of the war; and has had technical experience as Assistant to Dr. J. S. G. Thomas in the Physical Department of the South Metropolitan Gas Company from 1919 to 1922—being engaged there both in research and routine work. Mr. Hall has also studied at the Sir John Cass Technical Institute. He took his Intermediate B.Sc. examination of the London University in 1921.

The scholarship is intended to enable a student to take a course of study in Gas Engineering at the University and preparation for a responsible position as a gas engineer. Only one award of the scholarship has previously been made—to Mr. Leslie P. Ingram, who completed his University course in June, 1921, taking an Honours Degree in Gas Engineering, and is now Assistant Engineer and Chemist to the Plymouth and Stonehouse Gas Company.

ELECTRICITY SUPPLY MEMORANDA.

SOME electricians appear to be getting cock-a-hoop over the price at which electricity can compete with gas for cooking purposes. We rather think it much depends on what is comprised in the term "cooking purposes." If the expression comprehends boiling, or the 80 p.ct. or so of the work done on the hot-plate of a gas-cooker, then even theoretical calculations on the thermal and current price bases deny the accuracy of the suggestions that are made. However, we see the evidence of an expanding confidence in this respect in various places in the discussion on Mr. Vignoles' paper (noticed last week) at the meeting of the Incorporated Municipal Electrical Association. Mr. L. Robinson, of Hackney, is of the opinion that the public cannot afford to cook by gas, and that anyone prepared to supply electricity below 1½d. per unit would make a handsome profit; while people who cook by gas have money to waste. If this be so, then there must be a mighty lot of money thrown away to-day, in view of the enormous number of people who cook and do many other things by gas which they do not do by electricity, and which we assert, without fear of contradiction, they could not do by electricity at the same cost. Then from Marylebone Alderman Beaumont asserted that progress in heating and cooking had been decidedly satisfactory and profitable at the low figure of 1½d. per unit, flat rate. According to Mr. J. W. Beauchamp, the Director of the Electrical Development Association, the old figure of 1d. per unit for every 2s. 6d. per 1000 c.ft. still represents about the ratio at which it was possible to do good cooking business. A figure which is becoming general in London is 1½d. per unit, as against 5s. for gas. In London, 10d. to 1s. per therm will be quite common prices this quarter; and a therm is 100,000 B.Th.U. Investigation shows that about 80 p.ct. of the heating agent utilized by a cooker is for the hot-plate, and only 20 p.ct. for the oven. Prof. Barker, in his recent tests, showed an efficiency for gas-ovens of (according to type and consumption) from 24·4 to 39·4 p.ct.; and there are now burners and hot-plate constructions which will give an efficiency of about 60 p.ct. An electrical therm (at 1½d. per unit) is only purchasable for 3s. 7½d. Assume that 20 p.ct of the therm is used in the oven, and 80 p.ct. on the hot-plate, then using 20,000 B.Th.U. in the electric-oven at 90 p.ct. efficiency, would be 18,000 B.Th.U.; and 80,000 B.Th.U. on the hot-plate, at 45 p.ct. efficiency, would be 36,000

The Competitive Cooking Price.

B.Th.U.—together 54,000 B.Th.U. Take a figure as low as 30 p.ct. as the efficiency of the gas-oven, this would be 6000 of the 20,000 B.Th.U.; and take an efficiency of 60 p.ct. for the modern hot-plate boiling-ring, that would be 48,000 B.Th.U.—together 54,000 B.Th.U., or the same as for electricity, though 90 p.ct. efficiency is credited to the oven. Now we ask Mr. Beauchamp in fairness to say whether an electrical therm at 3s. 7½d. is as cheap for the domestic consumer as a gas therm at 10d. to 1s.

Other Cost Points.

There were, in the discussion, other points relative to cost. Mr. C. H. Wordingham said a need at the present time is the production of a cheap and reliable demand indicator; and he urged electrical men not to "monkey-about" with rateable values and other absurd things which have nothing whatever to do with the matter. He has recently advised a municipality of a straggling residential area containing some factories as to the price to be charged. The figure is 1d. per unit, whatever the purpose, *plus* a fixed charge. For transformed power, the fixed charge is £4 per quarter per KW.; for heating and cooking, £3 10s. per KW., but this is only charged in the two winter quarters. The plan, Mr. Wordingham thinks, is more attractive, and makes the consumer think he is getting something splendid. Is he, or is he not? There should be no pretence in business. Then Mr. E. E. Hoadley, of Maidstone, cherishes the belief that householders are paying more for gas other than for light than they would be if using electricity. Then why do they use gas? There is something wrong somewhere, if the electrical people, having this asserted great advantage on their side, have not yet succeeded in persuading householders to forsake gas and go over to them. Probably Mr. Hoadley bases his view upon these figures: In his own house, he says, the average cost of cooking for six people is 23s. per month, which amounts to £13 16s. a year; whereas, in one of the Corporation houses, cooking for three people only, the average monthly cost of gas through a slot meter is 18s. 6d. It is not much more expensive to cook for six people than for three; and the difference between Mr. Hoadley and the Corporation gas-using house is £2 14s. a year—a considerable sum for a working man. Moreover, in that particular house, perhaps the people are extravagant, or maybe they do much more under the heading of "cooking" on the hot-plate than Mr. Hoadley does on his. In some working-class homes, nearly all the hot water required is heated on the gas hot-plate. That is something that Mr. Hoadley would not do on the electric hot-plate.

Design of Cookers, &c.

There is evidence, too, that there is still some discontent among many electrical men with the design, reliability, &c., of the electric-cooker. Other electrical men do not like to hear the truth in this respect. There was Mr. Robinson, of Hackney, complaining of electric-cookers being made too small. In his opinion the ovens should be designed to deal with a 16-lb. turkey. He has also had complaints as to the size of the grill. Alderman Beaumont, of Marylebone, is of opinion that hot-plate and radiator elements should be made so that they can be replaced easily by the user himself. Then there were loud protests when Mr. G. Wilkinson, of Harrogate, ventured to say what many users have, in their experience, found that electric-cooking apparatus is not yet reliable enough to justify the free development of the cooking load. All this has been heard time and again over many years; and it looks as though repetition will never cease. Anyway, the desirability of an efficient maintenance service is advocated by electrical men who have experience with electric cooking apparatus. A further essential to the success of electric cooking, according to Mr. C. W. Charlesworth, of Wolverhampton, is that the consumers should be educated to understand how to use electric appliances. It all reads much the same as it did several years ago.

Sluggish Water Heating.

At the meeting of the Municipal Electrical Association, Mr. Hoadley, among other speakers, hoped that the problem of thermal storage and the supply of hot water for domestic use would be seriously explored. A good deal of attention is being devoted to this just now, and hopes of doing something is directed to the storage method of water heating—that is, by the use of immersion heaters in tanks. But in this particular line it is found that claims are always pitched too high; and nothing is said about heat losses through the time taken to heat up a quantity of water, and less is said about the expenditure of time in doing the work, which time factor is important in a household. "Electrical Industries" has had two special articles on the subject. In these it is pointed out that some people regard the problem as one simply of cost. Assuming this to be so, it is submitted that there are people in the world rich enough to be ready to pay a certain amount of money for additional convenience and labour-saving. Is it an "additional convenience" to be limited in the amount of hot water that one can have? Where, too, is the labour-saving compared with gas—particularly when the limitation of the quantity of hot water available may cause labour in another direction? Then it is stated that it is important to make a householder realize the money he is actually spending on hot water. There is no objection to this. It can easily be done with a coke-boiler or any gas-heated hot-water apparatus. But there is another thing that is equally important. It is to make a householder realize that with gas-heated apparatus as many baths as his family require can be had in the course of a day, and as much hot water as is needed, and at any time, for household purposes—subject, of course, to the capacity of the heater. The elasticity of gas-heating for water supply is immense. As said, the immersion heater is the one advocated; and the "Genii" is given as an example. In this the cold water enters at the bottom; and the hot water is drawn off from the top down an internal centrally situated hot-water overflow pipe. The cold water actually pushes the hot water up. That is how it is described. The point is worth examination. The admission of cold water must affect the heated contents of the tank; and as the heat energy is supplied at the rate of only 250 watts per hour, or 855 B.Th.U., which works out to an average of a shade over 14 B.Th.U. a minute, it will be seen that the restoration of heat after hot water has been withdrawn must be a sluggish process. Another thing—if the drawing-off pipe is situated internally, then the bottom part of it must go through the colder zone of water, which would reduce the temperature of the water in the pipe. Take the 10-gallon size of tank, loaded for 250 watts per hour. It is said that this will give six to eight baths per week, and 100 gallons of hot water for domestic purposes. What sort of baths are these? We make out that they would at most be 10-gallon ones; and for a family of six or seven persons, there would only be one bath per person per week. Take eight baths per week of 10 gallons each, that is 80 gallons, *plus* 100 gallons for other domestic purposes—together 180 gallons, or 1800 lbs. of water. Supposing this was raised 48° to 110° Fahr., the total degrees would be 111,600. In a week there are 168 hours to multiply by 250 watts, which is equal to 42 units. These units are equal to 143,640 B.Th.U., so that the efficiency claimed is 77 p.ct. We should absolutely question this as being a constant efficiency, with only 14 B.Th.U. per minute being contributed to the heating of the water. Spread over the day, the heat losses must be considerable from a tank having heat contributed to it at such a slow rate—particularly in cold weather, when hot water is required more than in warm weather.

Accumulating Heat Energy.

Electricity undertakings want some means by which heat energy can be taken from them during the night period for utilization during the hours when the demand is greatest. Mr. J. W. Beauchamp, of the Electrical Development Association, calls attention to the accumulator stove which, he says, may immediately offer some solution of the difficulty existing in regard to the use of ordinary electric fires "on a large scale" and in congested areas, such as occurs particularly in offices and business premises in large cities. Through the use of electric fires, Mr. Beauchamp says, in many cases mains and distribution difficulties have already arisen to an extent which cannot be compensated for by the comparatively short hours of use of the fires over the year, even at high rates for supply. The Harrison and Peard stove is one of these heat accumulation proposals. It consists broadly of a suitably lagged body through which air can be circulated by the opening of dampers, supplemented, if necessary, by the use of fans. Within the body of the stove are situated vessels or reservoirs containing any suitable substances of large heating capacity for a rise of temperature not greatly exceeding the temperature at which heat is required from the apparatus. In one model, acetate of soda has been employed as the heat storage material. The vessels containing the storage substance are heated by means of electric elements placed round them. The heat is released by the operation of dampers which allow air circulation; the heated air being discharged into the room at or near ground level. Mr. Beauchamp says it would not be difficult to provide for 80 p.ct. of the heating effect required in a room by storage convector, and 20 p.ct. by radiant fire element. Personally, we should not like to occupy a room with such a large proportion as 80 p.ct. of convected heat. However, Mr. Beauchamp thinks the subject worthy the attention of supply undertakings and manufacturers. Consumers may fight shy of a system of heating which requires two sources of heat—an accumulator convector and an electric fire.

The Stretford Clause.

The "Electrician" is delighted. Some years ago gas undertakings, as large ratepayers, and having in view the number of electricity concerns that made deficits towards which they had to contribute, sought the protection of Parliament, and obtained first the Bermondsey clause, which developed into variations, the best known of which is the Northumberland clause. These clauses aimed at compelling the electricity concerns to which they were applied so to order their prices for current that there should be no charge upon the rates, or if unfortunately something happened that caused one, there should be reimbursement through charges being adjusted in the following year to meet the deficiency. That is quite right; and there is no objection to similar clauses being placed on gas undertakings, though deficits in their case are of less frequent occurrence than in that of electricity concerns. However, the "Electrician" finds great satisfaction in the fact that the Stretford Joint Board have had a clause placed upon them which will ensure much the same thing as the Northumberland clause does in respect of electricity undertakings. The clause will be found in our "Parliamentary Intelligence" for June 28 [p. 895].

Gas Oil.—The market quotation has been reduced by ¼d. per gallon, which now stands at 5¼d. net and naked, *ex* wharf.

THE SOCIETY OF CHEMICAL INDUSTRY.

ANNUAL MEETING.

The Annual Meeting of the Society of Chemical Industry was held in Glasgow from July 4 to 11, under the presidency of Dr. R. F. RUTTAN, Professor of Chemistry at the M'Gill University, Montreal. The actual business part of the meeting was concluded on July 6; and the remainder of the time was spent in sight-seeing. The chief interest for "JOURNAL" readers lies in the meetings of the Chemical Engineering Group, on Thursday, when several papers were read. The meetings have taken place in the fine building of the Institution of Engineers and Shipbuilders, Elmbank Crescent; and on the opening day the Lord Provost of Glasgow gave the Society a hearty welcome, in the course of which he referred to the chemical department of the gas undertaking as demonstrating Glasgow's recognition of the value of science. The annual report of the Council showed a satisfactory state of affairs financially; but there has been a falling-off in the membership. Dr. E. F. Armstrong—the son of Prof. H. E. Armstrong, F.R.S.—has been elected President for the coming year.

THE PRESIDENTIAL ADDRESS.

Dr. RUTTAN devoted his Presidential Address to the subject of scientific and industrial research, and outlined the developments that are taking place in the Colonies. In general, the tendency has been for a recognition of the need for State aid in research development; and he foreshadowed the necessity for the establishment of State Central Research Institutes, in which problems not of immediate industrial or practical possibility should be investigated. So far as Great Britain was concerned, he said, the Industrial Research Associations had been only a qualified success; and he asked whether they would be continued on present lines when the period of the Government grant expires. It was hinted that the present co-operative research would not then be continued among the various firms, but that problems of immediate commercial importance would be dealt with, to the exclusion of those which—while of undoubted national importance—had no immediate prospect of commercial value. It was these problems which the State Central Research Institutes would have to undertake. In a review of the position in the Colonies, it was shown that, though the need for State aid is appreciated, the financial stringency is mainly responsible for holding-back any material assistance of the kind. Another point touched upon was the realization of the ideal of a Parliament of Science, in which all nations of the world would participate. A beginning had been made in the formation of the International Research Council, established in Brussels in 1919, the second meeting of which is called for this month. At present only allied and neutral nations are admitted, though the neutral nations differ from the allies as to the exclusion of the Central European Powers.

On the general question of co-operative research, Dr. Ruttan said that one good result of the Industrial Research Associations was that they had shown that the policy of industrial secrecy which had so greatly hampered the application of science to industry, was now almost obsolete. It had been proved that for most industries the closed door shut out no more than it shut in. Such Industrial Research Associations, however, were not so easily applicable overseas as in this country. The President then gave an outline of what is being done in Australia, New Zealand, Canada, and India in the matter of research, and alluded to an expression of opinion by the Chief Engineer of the Dupont Company, that research should not be undertaken by commercial firms unless there was an immediate prospect of the cost of production being reduced as the result. This, he said, was a clear business statement from a firm who spent over £40,000 a year upon their various research laboratories. Such firms could not be expected to jeopardize their financial standing for the attainment of an academic idea; and he used the point to emphasize his plea for State Central Research Institutes. Such Institutes, however, must have popular support, and be free from political influences.

MESSEL MEMORIAL LECTURE.

Prof. H. E. ARMSTRONG, F.R.S., on Wednesday delivered the first Messel Memorial lecture, in which he ranged over a number of subjects in his inimitable style; and in particular did he tilt at the Daily Press and even the Trade Press, for the lack of education of the public in scientific matters. He referred in scathing terms to "our word-spinning literary friends," and said that even the pages of the chemical journals were full of examples of careless writing due to careless thinking. The lecturer gave many notes concerning the life of the late Dr. Rudolf Messel, who left the Society the sum of £20,000, the complete allocation of which has not yet been decided upon. There will, however, be an annual lecture and medal. Prof. Armstrong developed in some detail a theory that all chemical change is an electrolytic process. He alleged that facts prove it to be so; and all doubters he referred to Faraday.

Coming back to Prof. Armstrong's plea for care in scientific thought, he said that this had been impressed upon us of late owing to the attitude adopted by the Official Referee of the Board of Trade appointed under the Safeguarding of Industries Act, 1921. Nothing could be more humiliating than the manner in which this gentleman, sitting as a Delphic Oracle, had created chaos in chemistry by his pronouncements upon our vocabulary. The discussions on the subject in various sections of the Society had been far from illuminating; and the lack of agreement among the speakers was sufficient proof that clear thinking was not our characteristic. Referring later to the proceedings under Part I. of the Act, Prof. Armstrong said these had shown that the witnesses—he would not call them chemists—were not even agreed as to what was a chemical. The innocent lawyer was trapped into the belief that it was something manufactured. Doubtless this definition was paid for—nothing else could explain and excuse its absurdity. All single things dealt with by the chemist were chemicals. A chemical could only be defined as a material which could take part in a chemical change. Combustion undeniably involved chemical change. Oxygen was a chemical. Who manufactured oxygen? Surely it was time that we should seek to deserve the title of scientific workers and thinkers.

ANNUAL DINNER.

The annual dinner was held at the Grosvenor Restaurant on Wednesday—Dr. Ruttan presiding over a large company. After the Loyal Toasts had been honoured,

Dr. E. F. ARMSTRONG proposed "The Society." He said it had been stated in the Press, and particularly in "The Times," that we had not any technical ability in this country. He felt bound absolutely to refute, with all the energy at his command, the suggestion that we have not in this country technical ability and aptitude both to invent and to carry out commercial operations. We have in Great Britain aptitude and ability to carry out any process under the sun. We do not want to import, introduce, smuggle, or convey under any Act of Parliament, under any definition, with or without duty, any kind of foreign chemist, foreign idea, or foreign brains into this country. The trouble of chemists was that they did not advertise themselves. If they would only adopt some of the usual methods of advertisement, things would be very much better.

Dr. RUTTAN, responding, expressed his complete agreement with what Dr. Armstrong had said with regard to advertisement and bringing the claims of chemistry more prominently before the notice of the public, as only in this way would they be able to influence the Legislature by bringing forward a strong body of public opinion. The suggestion he wished to make before leaving the Chair was that renewed efforts should be made to emancipate the chemists of the universities of the Empire from the domination of German reference books. This had every prospect of success at the previous meeting of the International Union of Pure and Applied Chemistry; but for some reason we in the Empire had not taken a very active part in this very important subject. That we should be in possession of English summaries of the chemical literature of the last seven years at the earliest possible date was a matter the importance of which was fully appreciated; and no more opportune time to break with the traditions of viewing chemistry "through German eyes" was likely to arise. The longer we waited, the more difficult would be the task. The almost exclusive use of German compendia and monographs throughout the whole civilized world had given that country a world-wide influence and prestige out of all proportion to the value of its contributions to knowledge. It must be known throughout the Empire that British chemistry was better than German chemistry. It must be known throughout the Empire that there were opportunities in England for gaining knowledge in chemistry greater than there were in Germany. This being the case, he felt sure that it would be possible to establish within the Empire reciprocity between the various universities, which would enable us to maintain the prestige of English chemistry and to increase very largely the number of men who were advancing in the science.

Sir WILLIAM POPE, F.R.S., proposed "The City of Glasgow," and spoke of the splendid hospitality which the Society had received at the hands of the Corporation and of all those connected with the meeting in Glasgow. The LORD PROVOST, replying, said the Corporation of Glasgow were always willing and anxious to welcome societies such as this, whose work so closely affected the health of large cities. Mr. W. J. U. WOOLCOCK, M.P., proposed "The Hon. Secretary of the Glasgow Section," and referred to the smooth manner in which all the arrangements for the meeting had worked. Dr. CRANSTON acknowledged the toast, and said that everybody connected with the task had done his share. Mr. E. V. EVANS proposed "The Glasgow Section," and Mr. J. H. YOUNG (Chairman of the Section) responded. Prof. G. G. HENDERSON proposed "The Visitors," to which Dr. ELLWOOD HENDRICK, of the United States, responded.

The following is an abstract of one of the papers on the subject of "Evaporation and Distillation" contributed to the Chemical and Engineering Group, with remarks made thereon at the meeting. The Conference of this group opened on Thursday afternoon, with Mr. W. H. COLEMAN in the chair.

The abstract of a paper on "Tar Distilling," by Mr. W. A. Walmsley, of Glasgow, and the ensuing discussion, are held over till our next issue owing to pressure on our columns.

OBSERVATIONS ON THE DESIGN AND WORKING OF AMMONIACAL LIQUOR STILLS.

By P. PARRISH, A.I.C.

This paper, which was accompanied by close upon fifty illustrations, was taken as read. The author, in recapitulating the essential features of his paper, said:

It is estimated that 300,000 tons of sulphate of ammonia are

produced in the United Kingdom by the direct distillation of the ammoniacal liquors arising from gas-works, coke-ovens, and shale distillation works. It is believed that, by a modification of the existing arrangement of distillation plant, the cost of steam in the production of the foregoing quantity of sulphate of ammonia, which will represent to-day approximately £270,000, can be reduced to at least half this amount. The significance of the paper, as affecting the national welfare, lies in the potentialities which the contribution foreshadows in the matter of fuel conservation.

In studying the papers relative to sulphate of ammonia manufacture which have been read during the last fifty years at the various meetings of several technical associations—particularly the various associations of gas engineers—one is impressed with their descriptive character, and the absence in most cases of any reference to the underlying principles involved in the distillation of gas liquor. It is believed that the experience and practice of the alcohol industry, as gained by Savalle (a Frenchman) who had intimate practical acquaintance with the Coffey still, were applied to the evolution of the first continuous columnar still for the distillation of gas liquor.

It would appear from the form which most English-made gas liquor stills assume, that mechanical considerations, such as facilities for cleaning, provision for the removal of bubbling hoods, and initial capital costs, have been the factors largely governing the design in the past. Failure to visualize the items which contribute to the cost of the manufacture of sulphate of ammonia, in so far as the still itself is concerned, is doubtless responsible for this somewhat circumscribed view.

Solutions of ammonia of such strengths as are typical of normal gas liquor behave generally according to Henry's law. Gas laws, however, while allowing of a ready interpretation of the conditions obtaining in the still, do not afford all the fundamentals of design. It would appear that further progress can alone result from patient observation of details such as can be obtained from practical working conditions.

Consideration of the costings as affecting ammonium sulphate manufacture reveals that still cleaning represents 0·2 p.ct., labour in the operation and control of the still 4 p.ct., and steam about 10 p.ct. Obviously, the dominant consideration in this connection is the cost of steam.

The summarized heat-balance having reference to the manufacture of sulphate of ammonia reveals that the distillation of gas liquor should be a self-supporting one, assuming all available heat is capable of complete utilization. The figures furnished show that in the distillation of 82 gallons of gas liquor (1·94 p.ct. NH_3) and 18 gallons of "devil" liquor—*i.e.*, 100 gallons, or 1020 lbs., in all—the heat, reduced to points of steam from and at 212° Fahr., entering the still is as follows:

(1) *Via* steam applied	267 lbs.
(2) *Via* preheated gas liquor	170 ,,
(3) *Via* cream of lime	9·3 ,,
	446·3 lbs.

The heat available for utilization is:

(1) *Via* gas stream from still	248 lbs.
(2) *Via* effluent liquor	198 ,,
(3) Heat arising from saturator—	
(*a*) Heat of dilution	8·1 ,,
(*b*) Heat of formation	68·8 ,,
	522·9 lbs.

The ratio of steam applied to liquor distilled is 26·1 : 100.

Incidentally, the figures show (assuming no attempt is made to utilize the heat available in the waste liquor) that the efficiency of the process, from the point of view of heat conservation, is only 32·5 p.ct. The disability with the existing arrangement of sulphate of ammonia plant lies in the fact that there is a far larger quantity of heat leaving the saturator than can be adequately taken advantage of in the gas liquor pre-heaters. A special multiple effect arrangement of plant, combined with a judicious system of interchange heating, would appear to be the ideal plant to ensure a satisfactory conservation of heat, so as to render the operation of the distillation of gas liquor more nearly self-supporting than it is to-day with existing plants.

Apart from the utilization of heat which the thermal balance-sheet indicates is available, experiments reveal that the design of the elements of existing gas-liquor stills can be improved, with consequent steam economy. Progress in this direction is likely to proceed by the evolution of elements which are so designed as to ensure the promotion of optimum bubbling, with impact of the bubbles so formed. Optimum bubbling is a function of a definite vapour velocity; but the velocity should not be such as will hold-up the liquid or will cause entrainment.

An examination of the table showing some characteristics of ammoniacal liquor stills, as supplied by English makers, reveals a marked absence of uniformity of many of the "essentials" of a gas-liquor still; and one is led irresistibly to the conclusion that standardization is fully warranted.

The question has frequently been asked, "What are the conditions governing the water-balance of a saturator?" The thermal data afforded by the measurements recorded in the balance-sheet are of interest in this connection. A simple calculation shows that 55 gallons of water are being evaporated per ton of sulphate of ammonia (25·74 p.ct. NH_3) being made with an acid feed of about 70 p.ct. H_2SO_4. The factors governing the water-balance of a saturator are undoubtedly the strength of acid used and the quantity of water which is introduced thereto.

Twenty years ago, several plants for the distillation of gas liquor under vacuum were installed; and the view was expressed that, with this form of plant, distillation was economical as regards steam consumption—particularly at those works where exhaust steam was available. Consideration of the relative vapour pressures of typical gas liquors at ranges of pressure between 20 in. mercury (absolute) and 33 in. (absolute), leads one to the conclusion that no great saving is likely to accrue; whereas additional expenditure of steam will be required for the operation of the vacuum pump and the pump installed to withdraw the effluent liquor from the still. Vacuum distillation may increase the rate of distillation for a given still design; but entrainment due to possible fluctuations of the vacuum is much more likely than with a still worked under pressure.

It is a matter of regret that the time-limit imposed for the introduction of the subject does not admit of allusion to other phases to which reference is made in the paper. It is my view that finality in the design and arrangement of plant for the distillation of gas liquor has by no means been reached, and that a suitable guerdon will doubtless await the technician who devotes himself assiduously to the solution of this captivating problem.

DISCUSSION.

Mr. CHARLES COOPER said that, in the author's remarks on the various designs, a common feature was mentioned—viz., the large number and area represented by the serrations compared with the diameter of the gas-way. The connection was one which could be better appreciated mentally when stated in precise values. The penalty of not truly levelling when erecting the column was, no doubt, more heavily felt in such cases. There was one consideration which the author had hardly touched upon, though it seemed to be quite important, and this was the entrainment of liquid from tray to tray upwards, and the manner in which it affected the efficiency of removal for a given steam consumption. Where entrainment took place in sensible quantity, two effects were felt. One of these could best be appreciated by stating the limiting case, which was what would obtain if it were possible to blow the whole of the liquor out of the still. A single-stage action would be produced; and any given proportion of removal would be very wasteful in steam compared with a multiple-stage treatment of the same gross quantity. In a more general form, this proposition could be stated as follows: In any counter-current process carried on in interrupted stages, there is a downward limit of the number of stages which must be provided to produce a definite proportionate stripping along with any desired richness of product—in this case, a steam-ammonia mixture. The first effect of entrainment was to blur the sharpness of the "cut" between stages; and the practical result was the same as if the gross capacity provided had been divided into a less number of sections. The second effect was one of dilution of the liquid in any section by the addition of weaker material from below, therefore producing the result that a greater quantity of liquor of lower strength was actually being stripped. These two considerations dictated at some point a limit on the amount of turbulence desirable in such a column. That considerable entrainment could take place was seen in the provision of a void and frequently a trap for drops at the outlet of the column. The lime-charged liquor was also liable to froth; but there could be no sharp demarcation between frothing and entrainment. This led him to suggest that the prevalence of large bubbling areas in various designs had possibly arisen from the manufacturer finding that the advantage of splitting his available area or volume into a larger number of sections was nullified by the conditions stated; and he had therefore compromised on empirical results. With regard to designing for minimum steam consumption, the limiting conditions appeared to be these: Once having all liquor admitted at the boiling point for the still pressure, the only heat absorptions were those represented by the dissociation of ammonia salts, and, of course, the hydrate, the radiation losses, and the elevation of the boiling point due to rising pressure as the liquor travels downward. All these were represented by condensation and loss of superheat (if any) of the steam, and presumably were irreducible or subject to proper treatment. It was also necessary further to provide a vehicle to effect the release of the ammonia; and the steam employed here had a minimum value represented by such values as Piron's, quoted by the author. The partial pressure of ammonia in solution of its compounds at about 100° C. was not the only quantity which appeared to matter, according to certain figures which he had examined. Without attempting to go too deeply into this aspect of the question, the conditions in the column to which those figures referred showed that the actual consumption was about one-and-a-half times the minimum quantity required, merely as a vehicle for the ammonia; and a part of the excess was represented by the losses to be made-up in the column. The consumption was about the same as that shown in the thermal balance-sheet; but the distribution was different—a greater proportion being admitted to the fixed still. It would be interesting to know why a 21 p.ct. radiation loss should occur from the heaters, unless they were not lagged.

Dr. E. W. SMITH said the only point he wished to bring forward—believing this was an opportune time to do so—was probably quite apart from the subject matter of the paper. However, as the paper was an attempt to show that increased efficiency should be obtained in sulphate production, he personally should have liked some very strong reference to what gas-works might do for themselves, before the ammonia liquor was sent to the distillery, in assisting to reduce the cost of sulphate production. Now that the new Gas Regulation Act had come into force, the therm basis was standard, illuminating power of gas was no longer necessary, and benzole was being, or should be, extracted from all coal gas, it was to him obvious that any gas undertaking which did not employ an acid catch for its ammonia extraction, prior to the purifiers, was wasting money and energy. Most gas-works supplied liquor of an average strength

of, perhaps, 8 oz.; whereas it would be an easy thing to produce a liquor of 15 or 16 oz. with an acid catch, and in this way eliminate at least one-third of the ammonia scrubbers, and all that went with them. It would be a boon to the distillers of liquor if that large amount of water—that 100 p.ct. dilution—could be eliminated; and now that this was really practicable, it would be well worth while concentrating on what might be done before they came to the stills, and before it was necessary to do any standardizing.

The CHAIRMAN said that Dr. Smith had raised a point of very great importance. Whether he personally agreed with all that Dr. Smith had said, was another matter; but the point he had raised might very well be discussed.

Mr. W. R. SIBBALD, speaking with regard to steam consumption, said his experience was that it was difficult to convince an engineer that he should use small pipes. As a matter of fact, in supplying steam to a still, it would usually be found that reducing the size of pipe between the superheater and the still gave a very considerable steam economy, amounting in cases to almost 25 p.ct. Another point was that it seemed to be common practice to use serrations in the hood; but he had discovered that this caused entrainment. He had found it an improvement to drill holes all round the hood, about 1-16th in. diameter. This gave a fine division of the gas, and brought about equilibrium much more rapidly. He then found that such a design was easily choked-up, and so, instead of putting 1-16th in. holes all round, a series of slots 3-32nd in. wide were tried; and, while preventing the choking, the sub-division of the gas was almost exactly the same as with the holes.

Dr. L. F. GOODWIN said the only point he could usefully bring-up was the question of intimate contact between bubbles and the liquid, which was the same type of problem in a column still or saturator as it was in any other type of absorption. It would be found that the depth of liquor on a plate was related to the serrated hood; and it had to be related, because the slightest change in level between any of the slits with regard to the rest of the liquor led to unequal bubbling. If there was a certain minimum depth to overcome a certain minimum amount of head, there was a tendency to more uniform bubbling all round. Finally, he should think that small traces of oil or an oil film in any liquor of the sort referred to in the paper would have a great deal to do with intimate contact between the gas and the still.

Mr. A. G. BYARD (France) said he assisted to instal the first Feldmann still in this country. Up to that time, the process used was the old egg-ended boiler. Referring to some points in Continental practice, he said he introduced a Wilton ammonia plant, which was attached to two steam-boilers. These were not over-worked at the time the plant was put in, but they were when the Wilton plant was installed. The latter worked quite satisfactorily; but the rest of the plant stood still. The gas manager asked what he was to do, and was told either to put in another boiler or else stop the gas-works. Eventually a friend asked if he could introduce into Spain some superheating apparatus. He arranged that the experiments should be carried out at his works. He started with high pressure in the boilers of (say) 90 lbs.—about six atmospheres—and the pressure of the steam when it was introduced into the ammonia still was about 14 lbs., or one atmosphere. The steam was superheated, and the gas-works went on their way; and only one boiler was found necessary instead of two. This question of superheating the steam was a point well worth study.

The CHAIRMAN, after complimenting the author, said it was the first paper that had been published in this country—he did not know about the Continent—in which some attempt had been made to apply scientific principles to the design, or to ideas of designing, stills for separating ammonia from gas liquor. A vessel or apparatus for treating gas liquor was called a still; but personally he did not think it was the right word. They were dealing with rather a peculiar condition of affairs. They had a liquor in which the gas was dissolved; and they wanted to devise an apparatus to boil out that gas. If it could be done by distilling the water, they would have an ideal apparatus. This was what was being aimed at; and if they had that in view—he was sure Mr. Parrish had, because he talked so much about the supply of steam—the more perfect a piece of apparatus they would get. With regard to the serrated hoods, he had distilled gases in many types of apparatus; and finally he was induced to put in a Continental still—the Mallet, in which there were serrations. With this still, the whole of the steam required to make a ton of sulphate of ammonia was represented by 9½ cwt. of coal. This was an actual figure from a week or a fortnight's work, and included the whole of the steam used on the plant, excepting that for pumping the liquor into the store bin. Possibly others had had experience of this type of still, and could give results. He asked the meeting to accord the author a very hearty vote of thanks.

Mr. PARRISH, replying to the discussion, said it was obvious that Mr. Cooper understood the fundamental principles involved in the distillation of ammoniacal liquor; but he was afraid he had misunderstood one or two of the points that he had raised in his remarks upon the paper. As far as the still was concerned, he (the author) had attempted to itemize the loss there; and he did not want to confuse the loss *via* radiation as between the still and the pre-heaters. The pre-heaters were put outside purposely with the view of assisting in cooling the steam and the waste gases which came from the saturator, because there was such a volume—apart from raising the ammoniacal liquor to boiling point—that water had to be used in order to dissipate this heat before the waste gases could be sent forward to the spent oxide burners for conversion. Mr. Cooper had directed most of his remarks to the question of entrainment. In connection with all the experiments he himself had conducted as regards the design of the elements constituting an ammoniacal liquor still, he had had the question of optimum velocity in mind. There were, however, certain figures which could not be disclosed in connection with these experiments. They were fundamental to any new design which might be patented. But he had not overlooked the question of entrainment; and he could assure Mr. Cooper that, so far as the stills mentioned in the paper were concerned, there were very few which were calculated to cause much difficulty from the point of view of entrainment, having regard to the definite vapour velocity which they gave. In point of fact, the steam could be increased by over 300 p.ct., and even then there would not be any difficulty from entrainment; so that this aspect had not been overlooked. The question of turbulency was very important, as he had attempted to demonstrate in the paper. It must be considered, of course, in relation to that maximum velocity which did not create entrainment. There was also another point which affected turbulency, and which also concerned the question of entrainment, and that was the question of constant steam. If Mr. Cooper had had any experience of stills throughout the country as he (the author) had, he would have found that there were very few people who understood the reducing valve; and, singularly, few who did understand the reducing valve ever attempted to control the working of it in such a manner that they could get anything approaching constant steam conditions. If they were rushing steam into a still in gulps at about 500 times the rate at which the steam ought to be produced, they would get turbulency of motion, quite apart from the question of the design of the particular element involved. Dr. Smith's remarks were very pertinent; and he himself was still investigating the question as to the maximum strength at which gas-works ought to operate their scrubbing plant in order that it might be reasonably economical both from the point of view of the gas-works and from the point of view of the chemical works which had to deal with the ammoniacal liquor. There was one difficulty so far as the acid catch was concerned when it was interposed between the scrubber and the purifiers, and it was a difficulty which a number of gas-works that had worked direct plants for the absorption of ammonia had been face to face with—viz, the question of the entrainment of the vesicular acid which caused souring in the purifier, and, by the reaction of the acid mist with the oxide of iron, formed sulphate of iron. Oxide of iron in the purifier allowed alkalinity; and it was absolutely impossible to purify the gas until that soluble iron, which was caused by reaction of the vesicular acid with the oxide of iron in the purifier, was neutralized and the ferric sulphate decomposed. He did not say it was impossible to use an acid catch and so obviate entrainment; but there was a difficulty, and it needed to be carefully considered in connection with any such proposal. Mr. Sibbald's remarks were directed to the type of plant as it existed to-day, and in that sense were not relevant to the kind which he had attempted, in the paper, to visualize as the type which would be evolved as the result of investigation work of this character. As to the question of serrations, mentioned by Mr. Sibbald, if he would refer to the paper he would see that the bubbler there was provided with 1000 holes; and if he put a magnifying glass on to that bubbler, he would find that the central hole was about twice the size of the outer ones. The hood in that case had been designed, not haphazardly, but as the result of a good deal of experience with this question of bubbling; and that had an important bearing on the question of getting equilibrium with minimum steam consumption. Dr. Goodwin referred to the depth of bubbling and the question of alignment. As far as he personally was concerned, extraordinary care was taken in aligning sulphate of ammonia stills. He was able to get them absolutely dead-level; and he believed in the foundations being such that there could not be any possibility of subsidence at all. He could definitely ensure that there was absolute uniformity so far as the bubbling device was concerned. It was wrong to add to the depth of the slit unnecessarily, because it only added to the steam consumption. The smaller the depth of the slit, consistent with ensuring uniformity, the better from the point of view of steam consumption. So far as the effect of oil was concerned, there was no ammoniacal liquor in the country that was absolutely free from oil. Those who settled best were invariably the works which introduced a certain amount of hydrocarbons specifically greater than the ammoniacal liquor itself; and these hydrocarbons were usually oils of the creosote fraction. So that in distillation one was always faced with the question of oil, and one received some little assistance in this direction. He was intensely interested in the remarks of Mr. Byard, and the introduction of the Feldmann still into this country. He had not only looked into the question of stills as produced in this country, but had given consideration to every still that had been produced throughout the whole world; and he could assure them that chemical engineers had a long way to go before attaining perfection in the matter of design. It had been said that there was no finality to thought or achievement; and he was certainly convinced that, so far as ammoniacal stills and their design were concerned, finality had by no means been reached yet.

ISLE OF WIGHT GAS ASSOCIATION.

The Annual General Meeting of the Isle of Wight Gas Association took place at the Totland Bay Hotel on Saturday, June 10—Mr. J. W. LORD (Freshwater Gas Company), the retiring President, in the chair.

The following officers were elected:

President.—Mr. F. W. Taylor, Ryde Gas Company.

Hon. Secretary and Treasurer.—Mr. F. E. Cox, Newport Gas Company.

Hon. Auditor.—Mr. W. C. Church, Secretary, Sandown Gas Company.

After the business meeting, tea was provided at the Totland Bay Hotel, when the members were joined by the ladies.

Society of British Gas Industries.—We have received from the Secretary (Mr. Arthur L. Griffith) a copy of the newly-issued rules and list of members of the Society. The President this year is the Right Hon. Lord Riddell; the Chairman of the Council, Mr. Albert Cliff, J.P.; and the Vice-Chairman, Mr. Frederick C. Tilley, M.I.Mech.E.

THE BEST POSITION FOR BENZOLE PLANT.

"Das Gas- und Wasserfach" for June 24 contains an article by the Gas Institute—the experimental and testing station at Karlsruhe of the German Gas Association—in which the best position for benzole extracting plant in the cycle of gas-works practice is discussed. It is acknowledged to be the general rule to place such plant immediately before the dry purification—*i.e.*, after the ammonia scrubbers. The general reason for this is doubtless the greater facility of introducing benzole washing at this point. It generally entails less new capital expenditure than elsewhere. Frequently there exists a disused naphthalene washer, which can be brought into use again for ammonia when the benzole process is introduced; or there may be a disused cyanogen scrubber which can be easily converted for benzole extraction. Again, several chambers of a rotary ammonia scrubber may be turned over to benzole, though this may easily lead to unpleasant consequences, for experience has shown that the outlet from the benzole portion may become stopped, and the washing oil overflow into the ammonia chambers. Without doubt, the introduction of benzole extracting plant into the system after dry purification will in most cases entail higher initial costs for alterations and additional mains, and almost always there is lacking suitable accommodation at this point. For all this, the Gas Institute maintains, it should be aimed at where at all possible, since any other situation in the cycle is technically unsound.

If unpurified gas is subjected to benzole extraction, there is practically certain sooner or later to be corrosion in the apparatus, which will lead to trouble. In its investigations on behalf of various gas-works, the Institute has had cases which clearly proved this assertion. If there is any slight defect in the ammonia washing, ammonia-sulphur combinations find their way into the washing oil, which in certain circumstances give rise to serious and rapid corrosion, which is particularly liable to give trouble with the tubing in the steam oil-heater. The sulphur combinations of the gas alone seem to cause no noticeable disturbance; but the more ammonia that passes the scrubber, the quicker appears to be the corrosive action.

This state of affairs can, of course, be remedied by more careful ammonia washing. But there are other troubles to be met. In two cases with which the Institute has had to deal, there were found in various parts of the benzole plant, especially those concerned with the distillation of the crude oil, large quantities of a bluish black product, part crumbly and part in the form of sludge, by which the apparatus was badly damaged. Analysis showed this to be composed of iron cyanide combinations, a certain amount of sulphur, and resinous substances. The latter were doubtless formed from the phenols and unsaturated compounds which are always found with benzole, and which, with their unpleasant results, are well known in connection with the use of crude benzole in internal combustion engines. They were in no way responsible for the damage to plant, which seemed attributable mostly to the cyanogen taken up from the gas by the washing oil. Certainly the sulphur compounds and the continually diminishing quantity of oxygen played an important part, but whether primary or secondary is hard to determine exactly. In fact, the same influences were at work as cause, in varying degree at various times, damage to mains and services, but in this case intensified by greater concentration of the harmful substances and by heat. The only really useful precaution that can be taken is thorough purification of the gas—*i.e.*, introducing the benzole plant after the dry purifiers. In this way, not only is the cyanogen nearly all removed, but also the last traces of ammonia, which minimizes the risk of damage, even when the scrubbers are working indifferently. The resinous substances are, of course, not eliminated by this precaution, but they will not cause damage to plant—merely necessitating periodical cleaning. Naturally their removal from the refined benzole is desirable, in order to keep its reputation as motor fuel.

These experiences from actual works practice have prompted the Gas Institute to issue this warning with regard to the installation of new benzole plant; and they illustrate the advisability of thorough and frequent examination of plant already in the system. No doubt the damage described cannot be entirely avoided even when purified gas only is subjected to benzole extraction, but certainly the life of the plant can be considerably increased by placing it after the dry purifiers.

Reduced Price of Fire Prevention Volumes.—An important point was omitted from our recent notice of the series of Red Books of the British Fire Prevention Committee dealing with the tests on the fire resistance of plain and reinforced concrete, carried out with assistance from the Department of Scientific and Industrial Research. The series is now complete. The point missing from our notice was that the price has been greatly reduced. The series, numbering 31 volumes, has been published by H.M. Stationery Office; the total cost of the individual volumes as published being £4 7s. 6d. But now, to bring the valuable results of the tests as a whole within the reach of all interested, complete sets (31 volumes) are being placed on sale at the price of £2 (by post £2 1s. 6d.). Individual items may be ordered; but no reduction from the published price can be allowed in their case.

THE GAS INDUSTRY IN CANADA.

Big Increases in Gas Consumption—Vertical Retort Installations at Vancouver and Victoria.

The official inauguration of a Glover-West vertical retort installation at the Vancouver Gas-Works was noticed in the 'JOURNAL" for May 31 last; and the presence in England on a well-earned holiday, after sixteen years' absence from this country, of Mr. John Keillor, has been taken advantage of to secure some further particulars of what is being done in connection with these particular works, as well as some interesting views on the position of the gas industry generally in Canada.

Mr. John Keillor—a brother of Mr. George Keillor, of Greenock—is Gas Engineer to the British Columbia Electric Railway Company, who own and operate, among other undertakings, the Vancouver (B.C.) Gas Company and the Victoria (B.C.) Gas Company. In all, the British Columbia Electric Railway Company (whose headquarters are in London) operate some thirteen or fourteen subsidiary companies, of which railway concerns are the chief. They have a total of no less than $55,000,000 of British capital invested in electric railways, electric lighting and power plants, and gas, all in and round Vancouver and Victoria cities. Mr. Keillor has been six years in Vancouver (where he succeeded Mr. R. W. Ford), after having spent some ten years in Hamilton (Ont.), as Manager of the Gas Company; and in these six years wonderful progress has been made in the sale of gas. The output chart shows that when Mr. Keillor went to Vancouver in 1916 the annual make was 254 million c.ft.; while, estimating on the figures so far obtained, the total for this year will be 600 millions—so that the output will have much more than doubled itself in the six years. As a matter of fact, the business actually doubled in a little less than five years. Going farther back, it is seen that in the comparatively short period of sixteen years the output has grown from 44 million c.ft. per annum to its present dimensions. In this time, the chart reveals only one stage of decline, which was during the early stages of the war. Needless to say, in order to keep pace with such expansion in demand as this, those responsible have been kept busy reconstructing and extending the plant.

The Vancouver and Victoria Gas Companies enjoy the distinction of being the only two gas companies in Canada who did not have to increase their charges during the war. As a matter of fact, as compared with 1915, the average price of gas for the two Companies is now about 5 c. per 1000 c.ft. lower. The main reason for this enviable position is that the Companies were more favourably situated than any of the others in regard to coal supplies, because British Columbia possesses untold millions of tons of coal close to Vancouver. There is, declares Mr. Keillor, more coal in that province than ever existed in Great Britain; and as yet it has hardly been touched. The coal thus ready to hand is a good gas-making coal, and gives an excellent coke; and it comes by barge from Vancouver Island, about 50 miles from Vancouver. There are also other grades, including anthracite; and at present only about 5 million tons a year is mined in the whole of British Columbia. These facts fully justify one in taking an extremely optimistic view of the future. Of course, labour went up during the war—about 140 p.ct.; and even now it has only been reduced some 10 p.ct. below this figure. Coal also rose 100 p.ct., though it will be understood, from what has already been said, that it was very cheap in pre-war days.

Early this year, both the Vancouver and the Victoria Companies started operating Glover-West verticals—a million cubic feet per day plant being put down at Vancouver, and a half-million cubic feet installation at the Victoria works (of which Mr. F. H. Hewlings is Manager). All the castings and the elevating and conveying machinery were sent from Manchester by West's Gas Improvement Company; while the steel for the buildings and the firebricks for the retort-settings were made locally. British Columbian firebricks are very good; and the Company had confidence in putting them in, because they had used them successfully for some ten years in the horizontal retort-settings. It will be noticed from the photograph of the installation that all the light and ventilation required in the retort-house are secured by perforations in the brickwork—some of these being made to form words giving sound advice to those who read them. The effect of this at night time is said to be very pretty. Another feature which the illustration makes clear is that ample space has been left for extending the retort-house, when required, without interference with the coke conveyors and bunkers.

Using Vancouver Island coking coal, the yield of gas is approximately 17,000 c.ft. per ton from the verticals with steaming, as compared with about 10,000 c.ft. per ton from the horizontals. This is gas of round about 460 B.Th.U. In answer to questions on the matter of calorific value, Mr. Keillor explained that gas of the quality named is made because the Canadian Government standard now requires all the companies to make gas of not less than 450 B.Th.U. The Government have fitted-up Simmance-Abady calorimeters in each city; and the gas is tested at intervals depending upon the size of the place—in the larger towns every day, and in the smaller towns twice a week. The 450 B.Th.U. minimum has been in force since November, 1919.

It was gratifying to be informed by our friend that the gas standards in Canada for a number of years have closely followed

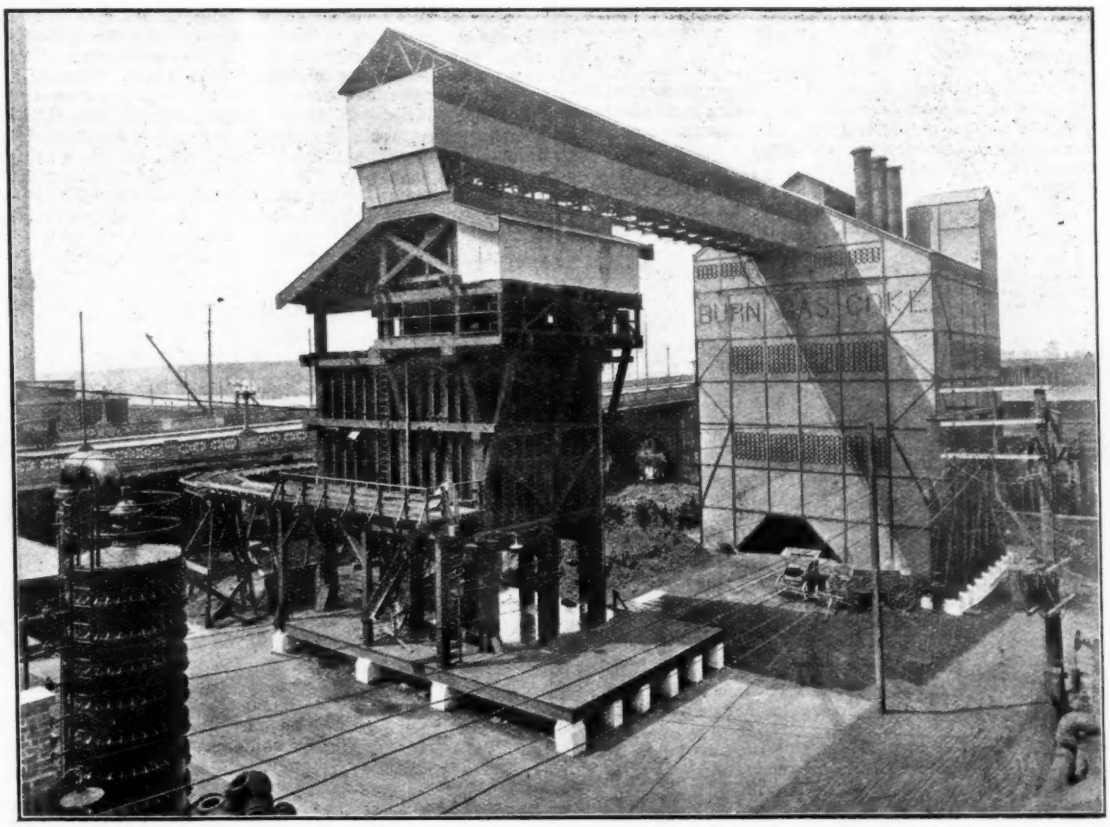
the British standards, and that what are regarded as three progressive changes have been made within the last ten years. Up to 1912, the gas was tested by the Government on a 16-candle basis, with a Sugg burner. Then it was changed to 16 candles tested with the South Metropolitan burner; and in 1915 the candle-power standard was superseded by the calorific standard—the Government requiring the companies to make 520 B.Th.U. gas. The reduction to 450 B.Th.U. in 1919 was made for economic reasons—in some measure because of the shortage of coal and oil, but primarily because the gas engineers were able to convince the Government officials that, while 450 B.Th.U. gas could be manufactured and distributed more cheaply than 520 B.Th.U. gas, it would give entire satisfaction to the consumers. Since the 1919 change, the Department of Inland Revenue at Ottawa have had passed by the Government an Order in Council giving them authority to require, when they may see fit to do so, the companies to sell gas on the therm basis. It is Mr. Keillor's belief that it will not be very long before the Canadian authorities adopt the therm basis of selling gas, though they have not brought the order into force yet.

In a number of cities on the other side of the Atlantic, manufactured gas (a term which has superseded the less suitable one of "artificial gas," as contrasted with natural gas) is being distributed at higher pressures than are customary in this country. For manufactured gas 8 or 10 in. pressure has been adopted in some cases, in view of the fact that many other cities have been satisfactorily distributing natural gas at much higher pressures than this. The natural gas companies distributing at very heavy pressures experience, it is said, but small leakage proportionately.

Mr. Keillor, in his visit to this country is combining business with pleasure; for he has it in mind to find out, if he can, whether his Company would do better for themselves by extending their vertical retort installations or by going in for a complete gasification process. It will be necessary very soon to make extensions in one form or another. Mr. Keillor personally is inclined to think that the future of the gas industry is bound up with complete gasification. His experience with natural gas has taught him to regard it as the duty of gas engineers to gasify as much as they can of the coal and the coke, because primarily they are sellers of gaseous fuel. Therefore he is looking forward to the time when the Canadian Government will put the industry on a therm basis, so that it will be left to the undertaking in each locality to decide for itself what is the best quality of gas to distribute in that particular district. From his point of view, it is a mistake to have one standard to control the operations of all the companies, inasmuch as undertakings scattered across the Continent are using four or five different grades of coal. These coals vary in quality appreciably, though they are all fairly good. Supposing the industry were put on the therm basis, Mr. Keillor, as at present minded, would probably recommend his own Company to adopt a quality of 410 B.Th.U. gas from local coals. In a complete gasification plant, he calculates he could get from 35,000 to 40,000 c.ft. per ton—using what oil might be necessary for carburetting purposes. The additional gas that would be obtained by the complete gasification process—that is, the difference between (say) 17,000 c.ft. and 35,000 or 40,000 c.ft.—would, he thinks, prove of more value commercially than the 10 cwt. of coke and the tar and ammonia derived from the vertical retorts.

Further chatting about calorific values, Mr. Keillor said that probably the chief reason why they have not yet in Canada adopted the therm basis of selling gas is because Canadian and American types of gas appliances—including cookers, water-heaters, &c.—are not equipped with burners which would efficiently use the lower quality gas. The average drilled burner on a gas-cooker in Canada is, as a matter of fact, not producing more than 25 to 30 p.ct. efficiency from the 460 B.Th.U. gas which is now being supplied. He has seen much better things in this country. However, gas appliance manufacturers in Canada are now considering the advisability of fitting to the appliances sent out by them higher efficiency burners such as are now to be found over here.

Mr. Keillor had much more to say on other interesting topics, which will form the subject of an article in the July issue of the "GAS SALESMAN."



VIEW OF THE GLOVER-WEST VERTICAL RETORT PLANT AT VANCOUVER.

Manchester and District Junior Gas Association.—The Directors of the Derbyshire Silica Firebrick Company have invited the members to visit their Friden works on Wednesday afternoon, the 19th inst. The party will be met at Buxton, returning after the visit *via* Bakewell and Haddon Hall to Buxton.

Municipal Gas Accounts.—From Messrs. Benn Bros., Ltd., of No. 8, Bouverie Street, E.C., we have received a copy of the "Gas World Analyses of Municipal Gas Accounts" for the year 1920-21, the price of which is 21s. net. The tables are mounted on linen, and follow on the lines of previous issues of the series; details being given with regard to 69 undertakings.

Desulphurizing Coke.—In the physico-chemical study of sulphur in coke, being made by Mr. A. R. Powell, physical organic chemist, of the United States Bureau of Mines at Pittsburgh, experiments have, says the "American Gas Association Monthly," been conducted on the study of the decomposition of calcium sulphide. It was found that, working with boiling water, calcium sulphide is hydrolized very slowly; the rate being increased by the addition of magnesium oxide. Small-scale laboratory tests will be made on coke containing fairly pure calcium sulphide, to discover if it is feasible for desulphurizing coke.

THE "N AND Z" TRANSMITTING THERMOMETER.

There are many uses on a gas-works for a reliable transmitting thermometer—for instance, in connection with the flue gases of a boiler plant, the inlet and outlet feed water of economizers, and also inlet and outlet flue gases of economizers, superheaters, steam pipes, tar stills, and chemical plant—and Messrs. Negretti and Zambra have patented an instrument which it would seem should fully meet these requirements.

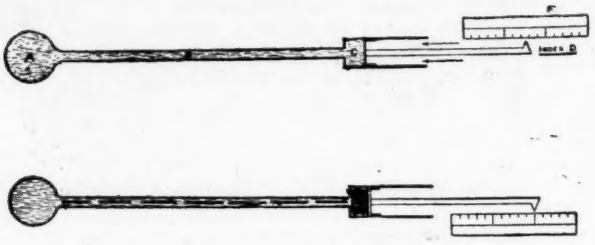


Fig. 1.

In the "N and Z" patent transmitting thermometer, no hair-springs or gears of any kind are used; the reading from the bulb goes direct on to the pointer. There are therefore no parts which can rust-up or give trouble; and there is no back-lash on the pointer at all. This is shown in fig. 4. The capillary tube is made of high-expansion material, and has running throughout its length a wire of low-expansion material, and of a diameter something less than the bore of the tube. The wire is in convenient lengths, so that it can slide in the tube when the temperature changes. The space not occupied by the wire contains the fluid. Fig. 1 clearly shows the arrangement. The volume of the wire and the fluid and the capacity of the tube are so calculated that, for a given change in temperature, the change in volume of the fluid is the same as that of the space it can occupy, so that no fluid is expelled into the indicator to move the index. It is pointed out that a perfect compensation can be obtained by this method, and that errors due to changes of temperature of the capillary are therefore eliminated. In other words, if the capillary tubing is placed alongside a hot substance, the temperature of this substance is not given on the dial. A test conducted at the National Physical Laboratory, at Teddington, showed that heating 10 ft. of the capillary 20° C. only affected the indicator $\frac{1}{10}$° C.

The extreme sensitiveness of the instrument was demonstrated to the writer. In fact, another test at the National Physical Laboratory showed that it took-up a change of temperature of 20° C. in 20 seconds. Another point about this thermometer is that the readings are unaffected by changes of barometric pressure. Further, it is of simple and strong construction, and all necessary protection is provided for the various parts. It can be supplied either as an indicating (fig. 3) or a recording instrument—the latter type being shown in fig. 2—and with any length of tubing within reason. A very important point is that each thermometer carries the guarantee of Messrs. Negretti and Zambra—a firm of world-wide fame in connection with the manufacture of scientific instruments—as being accurate within 1 p.ct. Already a number of these thermometers are in use in gas-works; and they are being widely specified for other purposes, while the largest thermometer makers in America have asked for the sole licence to manufacture them in the United States.

The sole agents for "N and Z" dial and recording transmitting thermometers for boiler-house purposes are the Boiler-House Supply Company (Mr. C. Roberts), No. 139, Queen Victoria Street, E.C.

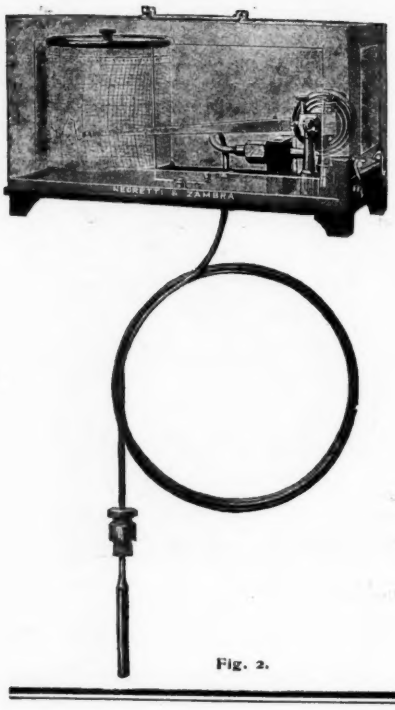


Fig. 2.

Fig. 3.

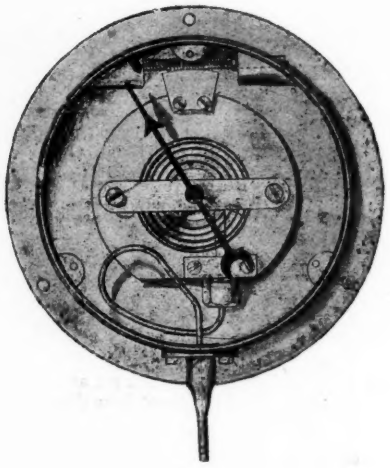


Fig. 4.

THE STANDARDIZATION OF GAS COOKERS.

REPORT OF THE STANDARDIZATION COMMITTEE OF THE NATIONAL GAS COUNCIL AND SPECIFICATION.

[Approved and Adopted by the Central Executive Board May 9, 1922.]

(*Continued from p.* 34.)

OVEN CONSTRUCTION.

Superimposed Ovens.

The Sub-Committee considered a suggestion whereby ovens might be superimposed over the hot-plate, and a wooden model was made and examined; but it was felt that such a proposition could be better dealt with independently of the standard cooker proposals.

Gas-Iron or Pilot-Light Connection.

Suggestions to the effect that connections for gas-iron and pilot-light should be left on the oven supply or hot-plate tap-rails were considered; but the Committee are of opinion that it would be better to include these items in the fixing estimate for running the supply to the cooker or hot-plate, in preference to adding to the initial cost of cooker construction and maintenance. The plug at the end of the tap rail could be replaced at any time by such a connection if required.

Enclosed Hot-Plates—Sealed Ovens and Central Heating of Ovens.

From investigations made, it was found that housewives complain of the constant rusting and discoloration of enclosed hot-plates, necessitating continual cleaning. In connection with sealed ovens, objections have so often been made that the flames are invisible; and, as regulation (more often than not) is done by observation of the length of flame, it was considered unwise to introduce enclosed flames, either in the centre at the base of the oven or in enclosed spaces at the sides. Moreover, in view of the increased cost of maintenance, extra cleaning, and possible

risk to the user, the Sub-Committee have not recommended either method whereby the flames are not fully exposed for ordinary observation.

Further, where a burner or burners are fitted in the centre of the base of an oven and covered by sliding cast plates, with observation slots, some risk of injury to consumers is possible by the spilling and igniting of fat on the burner plates below.

OVEN PACKING AND LININGS.

The Committee are of opinion that the packing of Nos. 1 and 2 sizes (with the exception of the doors) would not justify the extra initial outlay. The door should always be packed to prevent the possible scorching of clothes, &c., of persons when cooking.

It was found that the use of an efficient packing is accompanied by a saving of gas consumed in the oven; and, out of the several materials tested, slagwool has the advantage from the works and district points of view. It is suggested that 10 p.c. would be an average saving due to the slagwool method (provided the joints of cookers are properly tight or sealed in some way to prevent leakage); and a test made showed the position as follows:

Temperature with all Cooker Joints Cemented.

—	Actual.	Relative.
Slagwool	457° Fahr.	100
Sheet asbestos	448° ,,	98
Uralite	398° ,,	87

Sheet asbestos and slagwool are practically equal, so that expediency and cost become the determining factors between these two materials. Uralite was found inferior, and is little better than nothing at all. This is probably due to its stiffness, which does not allow of its making contact with metal walls of the oven, except at a few places. Actual cooking tests were made by a cooking expert; and the results reported were to the effect that "asbestos and slagwool were a 'dead heat' and uralite came out a bad third."

In considering the possible saving due to oven lagging or packing, it should be remembered that only about 20 p.c. of the total gas consumed in a cooker is consumed in the oven, so far as domestic use is concerned; so that 10 p.c. economy in the oven alone would mean only 2 p.c. on the whole cooker. The Sub-Committee considered this method of assessing the value of the economy in comparison with the charges incidental to packing. Where, however, ovens are used in greater proportion, and there is necessity for keeping kitchens, &c., cool, the lagging or packing is justified.

OVEN LININGS, ALUMINIUM TESTS, &C.

The question of oven linings was exhaustively investigated; and the results of an experiment with some aluminium oven linings which had been in daily use for nearly two years were considered. Samples of these linings were submitted to, and examined by, the Committee, which samples, after polishing, were apparently as good as when first fitted. Good aluminium permits of frequent cleaning; and the heat radiation of the oven is not impaired by its use. Some of the advantages over enamelled steel are as follows:

(*a*) No enamelling required.
(*b*) Sheets can be cleaned and cut as required (if defective at the edges) after removal from district, and then re-used in smaller ovens.
(*c*) The surface exposed to the heat of the burners just over the flames has not been found to show such definite signs of burning as do enamels after use.
(*d*) The relative costs at present per square foot of the two materials being approximately 1·25 for enamelled steel and 1 for aluminium for oven lining work.
(*e*) Old aluminium has a better scrap value than enamelled steel or iron.

The only disadvantage in the use of aluminium linings will be found by those gas undertakings who pass stoves through a furnace or muffle upon return from the district. The heats of these muffles probably sometimes reach 1300° Fahr.; and aluminium will then melt. It might, however, be advantageous first to remove the linings in such cases, and clean by the caustic bath method, well rinsing off afterwards.

After further experiments were made, the Committee came to the following conclusions with regard to best rolled sheet aluminium:

1.—That aluminium sheet may be obtained in various gauges and in various degrees of stiffness (16 B.W.G. sheets have been found to be quite suitable); but 15 B.W.G. sheets might obviate any slight buckling that may occur.

2.—That no deleterious effects need be anticipated. It seems that commercial aluminium can be obtained in a high degree of purity (98 to 99 p.c.), and that the impurities are not likely to be other than silicon and iron, both of which are harmless.

3.—Although the possible impurities in commercial aluminium are harmless as regards their effect upon food, they have a large bearing upon the power of the plate to resist corrosion when exposed to acids or alkalies. The latter material is the more important so far as gas-cookers are concerned. It seems that the impurities accelerate corrosion in two ways—namely, by auto-electrolysis and by forming porous cavities in the material into which the alkali penetrates, setting-up internal corrosion until it is neutralized. Both of these effects will be further investigated.

4.—So far as the surface corrosion is concerned, experiments show that after 300 washings of 5 minutes' duration with 5 p.c. potash, the loss of metal on an 18 gauge plate would be about 10 p.c.

5.—Aluminium rolled sheet of 15 gauge can safely be used as an alternative for linings or inner crown sheet, providing that 98 to 99 p.c. of aluminium is always present in its constitution. Any excess of impurities over 2 p.c. may probably shorten the life of the sheeting considerably.

OVEN CROWNS.

Various methods of insulating the tops of ovens were examined and considered. Apparently there is little advantage in going to the extra expense of tile or asbestos packing. Moreover, the small amount of heat which may be radiated through the top plate can be utilized for warming plates, &c., when placed under the hot-plate, in addition to heat radiated from boiling rings above when in use.

The following tests which were made on this question some time ago indicate that a products chamber formed by a single sheet of metal would be economical and satisfactory.

Small Types of Cookers Tested.	Gas Used in One Hour to Maintain a Temperature of 450° Fahr.
No inner crown	13·16 c.ft.
Cast iron	12·00 c.ft.
Fireclay tile inner crown	11·94 c.ft.
Packed cast iron (slag wool)	10·86 c.ft.
Double wrought sheet (enamelled)	10·79 c.ft.
Single ,, ,, ,,	10·77 c.ft.
Packed ,, ,, ,,	10·59 c.ft.

NOTE.—The temperatures were in all cases taken in the centre of the cooker at a height one-third down from the crown to the centre line of the burners.

THE "DROP" TYPE OF OVEN DOOR.

Consideration was given to the "drop" spring type of door frequently used in America, which has recently been introduced in this country. It was ascertained that the "drop" door does not meet with much approval in this country; and the members were unable to report favourably. The cost of springs, &c., will increase both the initial and maintenance costs, and add to the very large number of parts now stocked.

One disadvantage is the great uprush of heat, each time the oven door is opened, with possible scorching to persons using the cooker. When the door is hung on side hinges only, one side of the door and the top are partially opened when requiring to examine contents, the bottom being of little consequence from this point of view; but with the "drop" door both sides and top are opened.

The Committee, therefore, see no reason to recommend any departure from a well-established and satisfactory principle, which is backed by many years of experience.

RIGHT AND LEFT HAND OVEN DOORS.

The Committee's experience does not lead them to recommend interchangeable right or left hand doors, as there is little or no demand for the latter.

OVEN VENTILATION.

During the research made into the question of oven ventilation, it was ascertained that much excess air usually passes through the ovens of the majority of cookers when in action; and the following results will no doubt prove interesting, and offer at least a good reason for controlling the outlets automatically, if it can be done without setting-up smothering troubles on the districts. A gas-oven when heated acts very much like a warm uptake ventilator, the products of combustion sweeping through the oven, carrying with them a large volume of air—the volume depending on the structure of the oven and the conditions under which it is used.

It must be remembered that the presence of food cooking in the oven obstructs the fairway for the products, and therefore a smaller excess of air passes through than would be the case with an empty oven. Also, the evolution of steam from the food being cooked reduces the excess of air that passes through, because steam occupies space, and therefore leaves less room for air. These facts must be taken into account in considering any modification of the size of the flue outlet.

The experiments were directed to ascertain the volume of air that passed through a gas-oven when in ordinary use. It may be added that one solid shelf and two open grid shelves with the dishes containing water were used in the oven, so as to present some obstruction to the passage of the products.

A glance at the table overleaf will show that the percentage excess of air was greater at the lower consumption than at the higher. For instance, at 11 c.ft. per hour the excess for full aperture was 865 p.c.; whereas at about 30 c.ft. per hour the excess was only 350 p.c., and so on, for other flue apertures. As will be seen from the table, not only does the percentage of excess air increase as the consumption of gas is reduced, but in some cases the actual volume increases also. Table II. shows a similar set of results made with another type of cooker.

This super-aeration of the products at the lower gas consumption is probably characteristic of all cookers, though no doubt

TABLE I.—*Cooker* "A"—*With Tight Joints.*

Pressure.	Consumption.	Air for Combustion (A).	Volume of Air in Excess of (A).	Percentage of Excess.
	C.Ft. per Hour.	C.Ft. per Hour.	C.Ft. per Hour.	
With Normal Flue Outlet 7·1 sq. in.				
18/10	30·3	132	460	350
8/10	20·4	89	435	490
3/10	11·0	48	415	865
With Reduced Outlet 4·9 sq. in.				
18/10	30·2	132	460	350
8/10	20·4	89	400	450
3/10	11·0	48	430	895
With Outlet still further Reduced 3·15 sq. in.				
18/10	29·3	128	370	290
8/10	19·9	87	390	450
3/10	11·0	48	415	865
With Outlet still further Reduced 1·8 sq. in.				
18/10	29·0	126·5	285	225
8/10	19·5	85	335	395
3/10	11·0	48	325	675
With Outlet still further Reduced 0·8 sq. in.				
18/10	29·0	126·5	230	180
8/10	20·7	90·5	270	300
3/10	11·0	48	265	550

the extent of the super-aeration would be different with different cookers. Generally speaking, 30 c.ft. per hour is the rate of gas consumption necessary to raise an oven to cooking temperature in a reasonable time; and about 12 c.ft. is the rate required to maintain a sufficient temperature during the cooking period. So that in determining the most suitable area for the flue outlet these extreme consumptions must be taken into account.

TABLE II.—*Cooker* "B."

Pressure.	Consumption.	Air for Combustion (A).	Volume of Air in Excess of (A).	Percentage of Excess.
	C.Ft. per Hour.	C.Ft. per Hour.	C.Ft. per Hour.	
With Normal Flue Outlet.				
33/10	29·0	126·5	260	206
22/10	24·8	108	290	268
11/10	18·0	78·5	286	364
6/10	11·9	52	328	630
With Reduced Outlet.				
34/10	29·2	127	230	128
22/10	24·8	108	263	244
11/10	18·3	80	272	340
6/10	11·9	52	270	520
With Outlet still further Reduced.				
34/10	29·2	127	177	140
22/10	24·8	108	193	180
11/10	18·2	79·5	210	265
6/10	11·9	52	234	450
With Outlet still further Reduced.				
34/10	29·5	129	130	100
22/10	24·7	108	154	140
11/10	18·0	78·5	179	230
6/10	11·9	52	234	450

Regarding the extent of the heat loss consequent on the super-aeration of the products of combustion at the lower consumption. Suppose we assume that an air supply to the oven amounting to three times the volume actually needed by the gas is a sufficiently safe margin, then taking the figures underlined in Table II. we see that, whereas only 52 c.ft. of air was actually needed for union by combustion with the gas, no less than 380 (328 *plus* 52) c.ft. of air actually passed into the oven; so that, on the above assumption, the unnecessary super-aeration was 224 c.ft. per hour.

This volume of air was heated from room temperature (say, 60°) to about 300°, and therefore carried away about 1000 B.Th.U. per hour, which corresponds to about 2 c.ft. of gas. A saving of 2 c.ft. of gas on a consumption of (say) 12 c.ft. per hour would correspond to about 17 p.ct. This economy is confirmed by the following temperature observations:

TABLE III.—*Temperature in Oven, °Fahr.*

Time from Start.	Full Flue Aperture.	Reduced Flue Aperture.
45 minutes . . .	545	585
75 ,, . . .	405	460
105 ,, . . .	360	420
135 ,, . . .	350	405

A gas consumption of 30 c.ft. per hour was used for 45 minutes, after which it was reduced to 12 c.ft. per hour. It will be seen that the temperature of the oven was consistently higher with the reduced flue aperture; and, taking the conditions after 135 minutes as a criterion, the increased temperature due to the reduced flue was about 15 p.ct.

The problem seems to resolve itself into two parts:

1.—What is the correct flue aperture for full gas consumption?

2.—Is it practicable automatically to reduce the flue aperture as the gas is reduced? If so, to what extent?

1.—The experiments caused it to be thought that, if the flue aperture is such as to allow to pass into the oven three times the volume of air actually needed by the gas, the oven will be both satisfactory and safe. This will allow an aeration of the products of combustion to the extent of about 200 p.ct.; and while this is not excessive, it allows a margin for the reduction that must inevitably take place when the cooker has been in use for some time. All types of cookers were not examined; but it is believed that many of them fulfil very nearly these requirements at their maximum gas consumption.

2.—The practicability of the automatic adjustment of flue aperture was demonstrated in the "Hygienic" cooker some sixteen years ago. The extent of the reduction ought, it is felt, to be such as to preserve a constant degree of aeration at all consumptions; the degree being that prescribed above—namely, three times the quantity actually needed by the gas. After further experiments, it was decided that the flue outlets should be based, approximately, on one square inch of opening to each cubic foot of oven capacity.

Careful investigations were made in connection with the regulation of oven outlets. It is found that such dampers, when intelligently operated, may lead to economies of 10 to 12 p.ct., and in some cases more; but this saving is on the oven alone. Here again, it would be only (say) 2 to 2½ p.ct. on the total consumption of the whole cooker.

The combined use of flue dampers and slag-packed ovens may represent a total economy of something between 5 and 10 p.ct. of the total cooker consumption, as compared with one not equipped with either of these features. Much depends on the frequency of use of the oven. In the North, it is a common practice to bake bread at home. This, of course, will give added importance to oven economy.

Flue dampers are not considered desirable unless made positive in action and "fool-proof." In the damper system recommended by the Committee, the damper blade (or "butterfly") is operated in conjunction with the oven tap. In view of the large amount of excess air passing through certain gas-ovens (as shown by the foregoing tests), the Sub-Committee are strongly of opinion that this simple and positive method of regulation will add to the economy of the oven consumption.

OVEN VENTILATION (OTHER METHODS).

Other methods of ventilating gas-cooker ovens were made the subject of special attention, as follows:

(*a*) By the syphonic method of discharging the air through a double casing, the outlets terminating slightly above the floor line in the outer casing.

(*b*) By a later method whereby the air is primarily controlled at the base of the stove upon its entry to the oven; the outlet being in the form of a slot at the top of the back of the cooker.

This is regarded as a very important subject; the Sub-Committee fully realizing that in making any recommendation for oven construction the principle of ventilation must necessarily be safe to use with varying gas pressures and calorific values of gas, compatible with satisfactory thermal efficiency and general cooking results. The possibility of smothering of oven flames should not exist when the fairway of the oven is obstructed during its maximum cooking period, with due regard to the various positions in which gas-cookers are fitted in consumers' premises, where the conditions of combustion may be frequently altered.

OVEN (LOCKING TAP).

The Sub-Committee also recommend that, where a damper rod is used in conjunction with the oven tap, some simple and reliable form of locking tap for the oven supply should be considered and applied to prevent it being interfered with by children, who may, probably, be more attracted to the tap when they find that it also operates the damper rod. At the moment, no particular design of such a tap is recommended; but the matter will receive careful attention to ensure simplicity and reliability.

The standardizing of cookers and parts will, the Committee hope, in time lead to a considerable reduction in the stocking of the present multiplicity of parts by gas undertakings and manufacturers alike; but it is fully realized that this can never be totally eliminated, owing to the vast numbers of cookers of various sizes and types already in existence.

Very careful attention has been given to the subject of interchangeability of new standard parts when produced at the different works of the several gas-stove manufacturers; and in view of the technical factors governing this (not forgetting the human element), it is hoped that the making of master patterns and jigs will be executed by one firm. The difficulties are thoroughly appreciated by all members of the Sub-Committee; and strict supervision of the checking of such jigs, patterns, &c., will require to be maintained.

A considerable amount of testing and special research work has been conducted by the Sub-Committee, with the main object of verifying the results recorded from time to time. It is hoped this, added to the many years of general experience on the subject, will result in the introduction of a standard series of cookers

which will meet the requirements of the majority of gas consumers in this country.

CONFERENCE WITH REPRESENTATIVES FROM THE GARDEN CITIES AND TOWNS PLANNING ASSOCIATION.

The Sub-Committee further report that they met a deputation of ladies, representing the Garden Cities and Towns Planning Association, who had prepared a list of 35 questions relating to the construction and efficiency of gas cooking-stoves as applying to new houses, having reference more particularly to the houses erected under the direction of the Ministry of Health. During a very interesting and useful discussion, the Sub-Committee were able to convince the representatives of the Association that the gas industry were closely investigating the subject of gas-cooker construction; and it is of interest to note that the majority of suggestions put forward by the Association on behalf of practical housewives have already been embodied in the standard cooker proposals, and it is not necessary to make any alteration to those proposals already submitted to the Main Standardization Committee. A model of the proposed cooker was shown to the deputation, who expressed their satisfaction at the general arrangement and proposals.

At the termination of the discussion, the Secretary of the Committee from the Garden Cities and Towns Planning Association referred to the probability of the Association extending their investigations to cover other types of gas appliances, and hoped that the valuable assistance and co-operation shown by those present on behalf of the gas industry would lead the Association to approach the gas industry again before making any public announcement or report on gas appliances or their use.

In conclusion, the members of the Sub-Committee wish to record their thanks and appreciation to the Governor of the Gas Light and Coke Company and to the Birmingham and Manchester Corporation Gas Departments, for facilitating the business of the Committee by providing the necessary accommodation for the meetings from time to time, and enabling certain tests to be carried out to the Sub-Committee's entire satisfaction.

The detailed specification accompanies this report. [Publication of this will be begun next week.]

R. J. ROGERS, *Chairman.* F. W. GOODENOUGH.
GEO. HODSON. ARTHUR H. BARKER.
JNO. LEWIS. J. G. CLARK.
F. S. LARKIN. E. C. HOLT, *Secretary.*

March 31, 1922.

Compressor Outfit for Service Cleaning.

Mr. George Wehrle, Superintendent of the Gas Department of the Denver Gas and Electric Light Company, refers again to the means for removing obstructions from services and house piping. Some time ago it was stated that the ineffectiveness of the hand pump in large piping systems, or in cases of obstinate stoppages, coupled with the cost of doing the work, caused the Denver Company several years ago to equip an automobile with a small piston-type compressor, air receiver, and hose. This was very soon followed by an entirely new equipment, consisting of a Ford chassis and a Jackson rotary compressor, driven from the car engine through a special transmission and silent chain. A reel containing 100 ft. of ¾-in. armoured hose and a receiver having a capacity of 6 c.ft. of air at atmospheric pressure is part of the equipment. The compressor has a capacity of 6 c.ft. of free air per minute, and is capable of compressing to 125 lbs. per sq. in. The safety valve is usually set at 100 lbs., and the air supplied through the hose at 80 lbs. pressure. This proved very satisfactory; but still further improvement has been made in another unit, placed in service early in the present year. For this a Ford 1-ton truck chassis is used, and a larger compressor installed. The special transmission was re-designed and improved upon, and ball bearings used throughout. The compressor has a capacity of 12 c.ft. of free air per minute; and the same pressures are used as in the other unit. The Jackson compressors, manufactured by the Jackson Compressor Company, of Denver, were chosen on account of their small size, simplicity of mechanism, and efficiency. The cautions to be observed in the use of the air compressors are that the pipes to be blown out must be strong enough to stand the pressure applied; that all meters attached to the piping are shut off and disconnected; that proper pressures are applied as the work proceeds, by regulating the volume of air blown into the pipeline; and that excessive volumes of air are not blown into small mains through services, to the detriment of customers along the main. One of the pumping units will handle twice as many jobs in a given time as the same number of men using hand pumps; and the number of cases requiring the taking-down of the piping or digging-up the service, through ineffectiveness of the use of compressed air, is reduced 50 p.ct. in a given number of jobs. The cost per job is therefore cut exactly in two.

It was reported to the Blackburn Town Council that there had been an interview with the Chairman and Vice-Chairman of the Gas Committee on the question of fitting automatic controllers to the street-lamps. As a result, it had been decided to instal 1500 controllers, at an estimated cost of £4000. The Council approved the scheme.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

National Association of Technical Gas Officials.

SIR,—The report in the "JOURNAL" of the annual general meeting of the Association gives very clearly the present position; and it is unnecessary to add anything to the statements therein made. But we beg your assistance in allowing us to appeal to all members of the Association, through your columns, to help to lift immediately the burden of financial difficulty resting upon the Executive Committee.

The members of the Executive Committee assumed their responsibilities at a time of much difficulty, and in doing so realized they had an uphill task before them. They have worked strenuously on behalf of the members, and if with success that is not unqualified, yet it has been success in many directions—if the whole tale could be told. Even now the Association is being called upon almost daily for assistance.

We therefore appeal for the immediate payment of the current year's subscriptions, in order that the outstanding debts—inevitably contracted on members' behalf and consisting largely of rent, rates, and salaries due to Secretaries—may be liquidated.

R. G. SHADBOLT,
Chairman of General Council.
F. C. BRIGGS,
Chairman of Executive Committee.

Temple Courts, No. 55, *Temple Row, Birmingham,*
July 3, 1922.

Life of Gas-Meters Report.

SIR,—I failed to catch the President's eye when this was under discussion at the recent Institution meeting, and trust my addition to what has already been said will be of sufficient interest to warrant insertion in your paper. The report contains some valuable information, which will repay study; and our thanks are due to Messrs. Taplay and Parkinson and the Committee who have devoted so much time and study to the subject.

In regard to unaccounted-for gas and the chart given in the report, the increase of hydrocarbons due to the larger quantity of gas oil used during the coal strike in 1921 did not have the same effect here as in London. Our unaccounted-for gas was only ½ p.ct. down in 1922 over 1921, while we had more naphthalene stoppages than ever. Records taken every three months are not as reliable as records over a longer period; and the drop in the "leakage" on these two occasions may be a mere coincidence.

The easiest method for most gas-works to reduce aqueous vapour in the gas would be floating on the surface a good oil. We found this helped us considerably when we vaporized petroleum at the inlet of the meter. A great portion of the heavier fractions were precipitated in the meter and the holders, and certainly kept the naphthalene stoppages down; but since we adopted atomizing on the governor inlet, we have had more trouble from naphthalene and internal corrosion. One trouble we may expect from the use of oil will be the destruction of the paint on the outside of the holders by the oil finding its way into the cups when uncupping and cupping.

With regard to SO_2 in blue water gas, we have found the use of soda ash in the washing water satisfactory. This keeps it out of the relief holder and the purifiers. The corrosive action of this gas was brought to our notice by leakages in the catch purifier, where the bottom plates were eaten through by the acid water in the bottom; and in the station meter, where a new drum had to be installed.

It has been suggested that the top section of a crude liquor tower-scrubber just before the gas enters the clean water scrubber would be a satisfactory position for the use of chalk for removal of HCN, failing other plant being available. Perhaps Mr. Taplay would say if he thought this would be satisfactory. It has the disadvantage that the ammonium thiocyanate would be mixed with the bulk liquor and lost as a commercial article.

With gummy deposits on governor valves, we have had more trouble in the summer. Can a reason be assigned for this?

I do not quite agree with Section "F," paragraph 6. The tests carried out here rather point to restricted gas-ways being the cause of loss of pressure in meters instead of undue friction in its working. The arrangements by the Board of Trade for testing at increased pressure for losses will, no doubt, cause the makers to look into the question of the duct and valve areas within the meters.

I should suggest that it would be better if the size number of the "Standard" meters be always used in conjunction with the maximum rated capacity per hour, as being more intelligible and safer for the fitters; there being no relation between the number and the capacity, as in the case of the old-type meters, when multiplying the number of lights by six gave the nominal capacity.

H. KENDRICK.

Gas-Works, Stretford, July 6, 1922.

Some Gas-Burners and a Moral.

SIR,—In reference to Mr. Liberty's letter in the "JOURNAL" of this week, your readers will be interested to know that some time ago a Joint Committee was set up by this Association (of six representatives each of the Association and of the Lighting Section of the Society of British Gas Industries) to consider what steps could be taken (*a*) towards the standardization of the essential parts of burners, (*b*) towards the elimination of shoddy burners, mantles, and fittings from the market, and (*c*) towards the maintenance and development of gas lighting.

These points are now under careful examination, and it is hoped that a report will be ready for presentation at the Association's annual conference at Bristol, Oct. 16 to 18.

J. C. WALKER, Secretary,
British Commercial Gas Association.

No. 30, *Grosvenor Gardens, S.W., July* 7, 1922.

Education of Gas Engineers.

SIR,—Owing to the little difficulty which arose during the discussion on the report at the annual meeting of the Institution of Gas Engineers on June 20, I missed the opportunity of raising a question on the subject of education in the industry; but with the consent of the President and Hon. Secretary, it was agreed that I should send the contribution to the Technical Press. Members trust that the proposals now under discussion as to the education of future gas engineers will be laid before them before final ratification.

I was once a member of the Sub-Committee charged with planning not only a scheme for the education of gas engineers, but also the arrangements for the education of distribution staffs as well. It would be interesting to know what progress has been made under both headings.

With regard to the latter, as Examiner for the "Gas Supply" section, I am in a position of difficulty. In large and medium sized undertakings the tendency is to split the work into two sections—distribution proper (that is, all outside work) and sales, dealing with the apparatus, fixing, and maintenance of same. Two distinct staffs are required, with divergent qualifications.

In setting the questions in the "Gas Supply" Examinations during the last two seasons, I have had in view that the course (especially the Final Grade) was mainly to test the knowledge of aspirants for the higher positions in the larger undertakings—such as district superintendents, &c.—and for the posts of outdoor superintendents in the smaller undertakings. On further thought, however—and particularly in view of the British Commercial Gas Association's efforts in the "Scientific Salesmanship" competition—I am faced with a difficulty. Neither the present "Gas Supply" nor the "Gas-Fitting" course exactly fills the breach—unless a system of alternative questions or papers dealing with the two sides can be instituted, with the proviso that each candidate must confine himself to one set of questions only. This must be done under the "Gas Supply" course, as the "Gas-Fitting" course in the higher grades is confined to operative gas-fitters.

I should suggest that the Council take this matter into consideration, and secure the views of other "Gas Supply" Examiners and high officials in the distribution branches of gas undertakings. Any help I can render will be at the disposal of the Council.

H. KENDRICK.

Gas-Works, Stretford, July 6, 1922.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for July 5.]

Nos. 17,485 to 18,153.

ANDERSON, E.—"Electrical precipitation of suspended particles from gaseous fluids." No. 18,028.
BROWN, J.—"Retort-setting." No. 17,786.
DORMAN & CO., LTD., W. H.—"Ball-and-socket joints for flexible metallic pipe lines." No. 17,542.
EWING, A.—"Gas-burners for fabric-singeing, &c., machines." No. 17,980.
FLAVELL, J. W.—"Means for supporting cooking, &c., utensils over gas-rings. &c." No. 17,862.
FORD, F.—"Gas-heated radiators." No. 18,052.
FRANKE, C. W.—"Cockless valves." No. 17,655.
GUNNING, J.—"Time-controlled gas-taps, &c." No. 17,591.
HANSON, R. G.—See Dorman and Co., Ltd., W. H. No. 17,542.
HENSHILWOOD, A. B.—See Ewing, A. No. 17,980.
IKEDA, K.—"Process of extracting volatile oils from gases." No. 17,708.
ISOBE, H.—See Ikeda, K. No. 17,708.
KELHAM, J. C.—"Safety gas-valve." No. 17,637.
KIRBY, A.—"Vapour lamps for lighting, &c." No. 18,115.
KNIGHT, E. O.—"Gas combustion chamber and heat-retainer for gas-stoves, &c." No. 17,763.
KOPPERS, H.—"Coking or carbonizing." No. 17,834.
LEGG, A. di.—"Apparatus for detecting and signalling leakage of gas." No. 18,044.
LODGE-COTTRELL, LTD.—See Anderson, E. No. 18,028.
MARTIN, W. J. M.—See Legg, A. di. No. 18,044.
MESSENGER & SONS.—See Kirby, A. No. 18,115.
MILLAR, W. S.—"Device for gas-ovens." No. 18,005.
NORTH, O. D.—"Means for distribution and measuring of fluids." No. 17,776.
OKAZAWA, T.—See Ikeda, K. No. 17,708.
QUAIN, J. R.—"Light-distributing apparatus." No. 17,913.
RADIATION, LTD.—See Ford, F. No. 18,052.
RADIATION, LTD.—"Flues, chimneys, &c." No. 18,053.
ROSSI, P.—"Stoppers or caps making gas-tight joints, and screwing lever combined with box spanner." No. 17,877.
SCHOTH, G. A.—"Gas heating-stoves." No. 17,793.
SCOTT, E. W.—See Schoth, G. A. No. 17,793.
SNELL, C. SCOTT-.—"Bunsen burners and other injectors for elastic, &c., fluids." No. 17,696.
SOC. L'ASTER.—"Liquid meters." No. 18,072.
STONEY, H. R. G.—See Dorman & Co., Ltd., W. H. No. 17,542.
TOOTH, L. F.—"Treatment of smoke and fumes." No. 18,066.
VICARS, E. L. & T.—"Rail gas-burners." No. 17,499
WEAVER, L. T.—"Gas cooking-stoves and hotplates." No. 17,557.
WEBB, R. W.—See Weaver, L. T. No. 17,557.
WEST, G.—See Millar, W. S. No. 18,005.
WOOD, H.—"Apparatus for discharging clinker from retorts, &c." No. 17,944.

When the gas-meter of a well-known Burslem firm was examined in order to ascertain the consumption of gas during the December quarter, it was found that the meter was standing. A sub-committee have since gone into the matter, and have decided to forward to the firm an account for 30,000 c.ft. of gas for the quarter.

REGISTER OF PATENTS.

Producing Ammonium Chloride.—No. 159,817.

CHRISTENSON, O. L., HEDMAN, B. A., both of Stockholm (the said B. A. Hedman being the assignee of GISIKO, K. I. M., of Stockholm).

No. 6313; Feb. 24, 1921. Convention date, March 3, 1920.

This invention relates to an improved process of producing ammonium chloride in coking or distilling coal in coking plants and gas-works, and has for its object to make it possible to obtain a much higher output of ammonium chloride than hitherto has been possible in coking or distilling coal containing nitrogen.

It has already been proposed to add lime and chloride of sodium or chloride of calcium to the coal in manufacturing coke, which additions react with the silica contained in the ash of the coal so as to improve the coke; but such additions, the patentees say, cannot materially improve the output of nitrogen compounds from the coking process. It has also been proposed to manufacture ammonium chloride by producing cyanides from coal, air, or atmospheric nitrogen and a base such as baryta at high temperature and decomposing the cyanide by steam in the presence of silica and a chloride such as sodium chloride, which latter is also decomposed by the combined action of the steam and the silica, so that hydrochloric acid is liberated and combines with the ammonia formed by the decomposition of the cyanide. According to this invention, the reactions take place at the usual coking temperatures without any supply of air or atmospheric nitrogen and without an addition of a base, as the ammonia is formed from nitrogen already present in the coal.

The invention consists chiefly in that an alkali, or alkaline earth chloride, and free silica mixed into a pulp with water are mixed with the material to be distilled or coked, whereupon the mixture is heated until ammonium chloride distils off. The silica at the usual coking temperatures decomposes the chlorides and expels, in the presence of steam, hydrochloric acid, which combines with ammonia simultaneously expelled from the fuel to produce ammonium chloride. It is claimed that the reactions take place essentially easier and more completely with the addition of silica.

Producing Ammonium Chloride from Coal or Shales.—No. 169,948.

Patentees of No. 159,817 (above).

No. 6446; Feb. 25, 1921. Convention date, Oct. 6, 1920.

(Patent of Addition to No. 159,817.)

This invention, which is a modification of that described above, relates to a method for further improving the output of ammonium chloride in coking or distilling coal or bituminous shales containing nitrogen, and consists in that besides the addition to the material to be treated of a pulp of alkali, or alkaline earth chloride, silica, and water, an addition of free hydrochloric acid (preferably in liquid state) is used. The effect which is gained by the latter addition seems to result from the free hydrochloric acid binding the ammonia which is evolved at low temperatures ere the alkali, or alkaline earth chloride, has been decomposed to any considerable extent, while the ammonia evolved at higher temperatures combines with the hydrochloric acid, which is formed by the decomposition of the chloride by the influence of the silica and the steam from the water used at high temperature.

In manufacturing illuminating gas from coal, the patentees prefer to use 3·2 kg. of hydrochloric acid with a percentage of 30 p.ct. of HCl, 2·5 kg. of silica (SiO_2), and 4 kg. of common salt (NaCl) per 100 kg. of coal. An output of 33 kg. of ammonium chloride per ton of coal may be obtained in this manner.

The patentees are aware that it has been proposed to manufacture ammonium chloride by producing cyanides from coal, atmospheric nitrogen, and a base such as baryta at high temperature, and decomposing the cyanide by steam in presence of gaseous hydrochloric acid, which may be added in free form or be expelled from a chloride by the combined action of silica and steam at the temperature used. They do not claim such process.

Gas-heated Ovens and Retorts.—No. 174,039.

STETTINER CHAMOTTE-FABRIK AKTIENGESELLSCHAFT, of Stettin.

No. 29,420; Nov. 4, 1921. Convention date, Jan. 12, 1921.

When an oven apparatus comprises a plurality of units or chambers (containing, for example, retorts) each of which is separately heated, it is possible either to heat each chamber by means of gas produced in a separate generator directly connected to it, or to connect all the chambers to a central generator common to them all, which produces the gas required for all the chambers, and supplies it to the heating flues through pipes. According to this invention, disadvantages of both these methods (which the patentees indicate) are avoided, while their advantages are retained; this being effected by providing for each oven unit an auxiliary genertor, which serves only for starting the heating, and is directly connected to the unit, whereas all the oven units in the apparatus are connected to a central generator for normal working.

The patentees claim: Oven apparatus comprising a plurality of separately heated oven units, characterized in that each oven unit is provided with an auxiliary gas generator, which serves only for heating it up and is directly connected to it, all the oven units in the apparatus being connected for normal working to a main gas generator common to them all.

The auxiliary generators can be cut off from the respective oven units, and are connected to each other by means of conduits provided with valves which can be closed. Above the auxiliary generator, which is directly connected to the oven, there is a recuperator which is heated by the waste gases of the oven, and through which the gas from the main gas generator passes before it enters the oven.

Joints of Main Pipes.—No. 180,379.

HELPS, G., of Nuneaton.

No. 2712; Jan. 20, 1921.

In the specification No. 145 190 provision was made for rings of malleable steel or iron, inserted at each end of a cast metal pipe, whereby a joint could be made by welding together the rings on two adjoining pipes. According to this invention the rings surround the cast metal pipes; a sound joint being made, for example, by shrinking the rings on to the pipe or casting the pipes within the rings with the use of a flux or the like, as described in the former specification.

Gas Cooking Ovens.—No. 180,955.

WHITELEY, T., of Ripponden.

No. 25,205; Sept. 23, 1921.

This invention relates to gas cooking ovens embodying a suitably shaped box within a similar but larger casing carried on four legs and having a burner at the top and at each side, or at one side near the bottom, within the space between the two sections. Improvements are claimed consisting in the arrangement of the two burners within the air jacket, and in the method of and means for supplying and controlling the fuel to the burners, the arrangement being such that the heat within the jacket may be varied in the top or bottom as found necessary when cooking meat, baking bread, or when baking different kinds of pastry. The invention may be applied to, or substituted for, the ovens of ordinary kitchen ranges.

The oven is made of steel, sheet iron, cast iron, or other suitable metal, or a combination thereof, and in the usual box form with the customary projecting ribs supporting the ordinary oven plates. The cooking chamber is more or less enclosed or surrounded by a similar but larger box, leaving a suitable space between the two which serves as a heat chamber or jacket. Suitable supports are attached to or formed upon the outer box or casing for supporting and positioning the inner box. A flange surrounding the front of the latter closes, when the two boxes are assembled, the open ends of the heat jacket. Suitable bunsen burners are placed in the heat jacket, one under the bottom of the cooking chamber and the other at the back thereof, but nearer the top than the bottom of the jacket. Both burners have a common source of supply for the fuel, yet each may be separately controlled whereby more heat may be obtained in one part of the jacket than in another, according to the effect desired when cooking, baking, or boiling food. Suitable openings are formed in the top of the outside casing to receive pans, kettles, or the like, for boiling purposes; and a pipe fixed in the upper portion of the jacket serves as a flue or exhaust for the products of combustion.

Figs. 1 and 2 are sectional side and front elevations respectively of an oven constructed according to the invention.

FIG. 1.

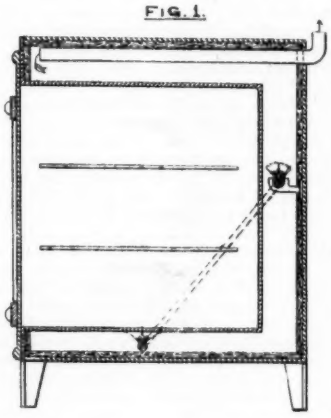
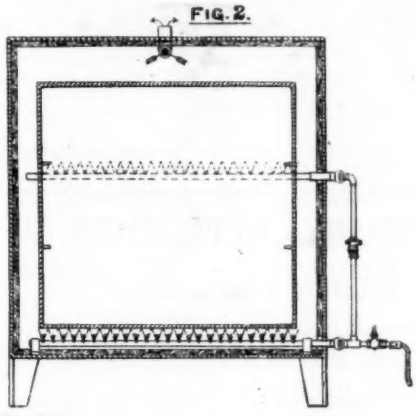


FIG. 2.



Whiteley's Gas Oven.

Catalytic Processes involving Gaseous Carbon Compounds.—No. 160,466.

CHEMICAL FUEL COMPANY OF AMERICA, of Louisville, Kentucky (Assignees of STEVENS, E. W., of Baltimore).

No. 7026; March 3, 1921. Convention date March 18, 1920.

One of the troubles in the purification of gas by a catalytic process is the difficulty of maintaining clean the surfaces of the catalyst.

The invention relates to the carrying out of catalytic processes involving gaseous or vaporous carbon compounds, and a principal object is to maintain clean surfaces and effective catalytic action of metal catalysts such as nickel, iron, or cobalt. However, where catalytic actions upon hot gases containing carbon are concerned, there is a tendency of these catalysts, and particularly with those of the nickel class, to cause separation and deposition of carbon. Frequently the catalyst rapidly becomes clogged with separate carbon, thereby losing effectiveness. In various commercial processes of producing hydrogen from steam, this is done with the aid of carbon monoxide. Carbon monoxide is oxidized to carbon dioxide by H_2O, with the production of H_2; and this action is much facilitated by the presence of a catalytic metal, generally nickel, cobalt, or iron. But there is also another reaction which is induced by these catalytic metals—the conversion of $2CO$ into CO_2 and C; this C being deposited in or on the catalyst. Consequently in these commercial methods for producing hydrogen, there is the risk of this side reaction taking place and the catalyst becoming clogged. Commercial water gas, which is substantially a mixture of equal parts of CO and H_2 can be converted by nickel, &c., into a mixture of 2 parts by volume H_2 with one part of CO_2. As the CO_2 is easily removed from the mixture, this is a cheap method of making hydrogen. But in catalyzing steam-water-gas mixtures by nickel or the like in the manner described, there is always this tendency towards the deposition of carbon; and this carbon rapidly clogs up the nickel and lessons its catalytic activity. Hydrocarbon gases are also much affected by these metals; the result varying with conditions. But there is always a tendency, as with CO, for the molecular rearrangement to go forward in such a manner as to deposit solid carbon. This effect has rendered commercially unpractical many otherwise desirable methods for the catalytic conversion of hydrocarbons. For example, in the conversion of high-boiling complex hydrocarbons into simpler and lower-boiling hydrocarbons (making gasolene from gas oil, &c.) by heat, the action is much facilitated and regulated by the presence of metals such as nickel. But this facilitating action is more or less short lived; the catalytic metal rapidly sooting up and going out of action.

The patentees have found that the deposition of carbon on the catalytic metal, or sooting up, in these actions can be obviated by the simple expedient of showering the catalyst with high-tension sparks—that is, by placing the catalyst in circuit with a source of high potential, rapidly oscillating alternating current; the catalyst forming one electrode, and another electrode being located within sparking distance thereof. Or the catalyst may be made an intermediate electrode between two other electrodes connected to the terminals of the source of high-potential oscillating current. With this arrangement the active surface of the catalytic metal is bombarded with high-potential sparks, and is thereby kept clean and effective. The action of the sparking in this relation is not merely to remove the carbon which deposits; it prevents the formation of carbon. In other words, in reactions which would normally cause a deposition of carbon, the carbon does not deposit. An electric discharge of this nature, in addition, has certain catalytic actions; and it may be, and very likely is, that the result attained is, so to speak, a compound one—in part due to the hot catalytic metal, and in part to the fact that this hot catalytic metal is receiving and emitting sparks. The patentees do not, however, wish to limit themselves to any theory, and merely record the discovery that a useful effect is attained by the combination of a hot catalyst and a spark discharge in this relation.

They are aware that in the production of propylene by the union of acetylene and methane, copper gauze or copper wool has been used as a catalyst, being contacted with gases while they are subjected to the action of violet and ultra-violet rays, or to the action of a silent electric discharge. Another prior proposal utilizing a catalytic process for saturating unsaturated fatty acids and their glycerides by combining them with hydrogen, had for its object the maintenance of the catalytic substance (such as finely divided nickel or platinum metals) permanently active, and the increasing of the activity of the catalyst. Such process consisted in permitting the rays of silent electric discharges to impinge on the surface of the catalyst or contact substance.

The invention may be usefully applied in the manufacture of hydrogen from blue gas or water gas. In so doing, the blue gas, admixed with a suitable volume of steam, is passed through a nickel (cobalt, iron, &c., may be used) screen or diaphragm of wire netting or perforated metal. This diaphragm is maintained at a suitable temperature for effecting the catalytic reaction desired, which in this case would be about 400° C. Any suitable source of heat may be employed; but it is convenient to use a heating current of low voltage and high amperage. In this particular case, nickel is highly desirable, as combining good catalytic qualities with a good power factor.

Gas-Regulator for Incandescent Burners. No. 181,079.

HINKS, T., of Birmingham.

No. 6802; March 1, 1921.

This invention relates to a gas regulator for use with incandescent gas-burners, and is adapted more particularly for use with burners of the inverted type. It has for its object the provision of a regulator

which will be simple, cheap to manufacture, will be self-contained, and which will be of generally improved construction.

The regulator comprises two hollow members which are rotatably associated together by flanging over an edge of one member on to a shoulder on the other member, and a diaphragm carried by each member forming a closure for the member to which it is secured; the two diaphragms being disposed in contact with each other and having orifices which are spaced apart from the axis of the regulator, all forming a self-contained unit and arranged to allow the volume of gas passing to be regulated, or the passage of gas to be stopped altogether, by relative rotation of the parts.

The hollow member into which the gas passes through the orifices in the diaphragm is provided with an outlet end having a central outlet orifice.

The end of the tubular member is extended in the form of an internal boss around the orifice, and has to provide a recess around the orifice for the reception of any foreign matter which may pass through the orifices in the diaphragm or faces and which would choke the outlet orifice.

Fig. 1 is a side elevation of the device to an enlarged scale, and

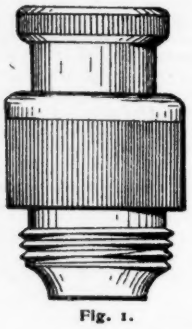


Fig. 1.

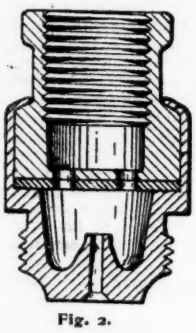


Fig. 2.

Hinks' Regulator for Incandescent Burners.

fig. 2 a sectional view showing the holes in the diaphragm in alignment to allow a free passage of gas.

PARLIAMENTARY INTELLIGENCE

HOUSE OF LORDS.

Progress of Bills.

Buckhaven and Leven Gas Commission Bill: Read the third time, and passed.

Stretford and District Gas Board Bill: Returned from the Commons, agreed to, with amendments, which were considered, and passed.

Windsor Gas Bill: Reported, with an amendment.

HOUSE OF COMMONS.

Progress of Bills.

Croydon Gas Bill: As amended, considered; read the third time, and passed, with amendments.

Ramsgate Corporation Bill: Reported, with amendments from the Local Legislation Committee.

Stretford and District Gas Board Bill: Read the third time, and passed, with amendments.

Gas Regulation Act, 1920.

A copy was presented of a Draft of Special Order proposed to be made by the Board of Trade under the Act on the application of the Walton-on-Thames and Weybridge Gas Company.

Public Utility Companies (Capital Issues) Act.

A copy was presented to both Houses of a report on an application by the Southwell District Gas Company to the Board of Trade under the Act.

WINDSOR GAS BILL.

This Bill [see "JOURNAL," May 31, p. 508, and June 7, p. 569] was ordered to be reported for third reading by the Unopposed Committee of the House of Lords on Tuesday of last week. The only alteration in the Bill since it left the House of Commons was in respect of the provisions with regard to reserve fund. There is a clause in the Bill dealing with the creation of a reserve fund, in which it is provided that out of the moneys and securities standing to the credit of the reserve fund of the Company at the commencement of the Act, there shall be carried to the reserve fund to be formed moneys and securities having an aggregate value of £4000 at the commencement of the Act. The figure of £4000 (which was inserted in error) was altered to £3000.

NEATH CORPORATION BILL.

This Bill [see "JOURNAL," Jan. 11, p. 80] was ordered to be reported for third reading by the Unopposed Committee of the House of Lords on Tuesday of last week. No material alterations have been made to the gas section.

DONCASTER CORPORATION BILL.

The Local Legislation Committee of the House of Commons, presided over by Sir WILLIAM MIDDLEBROOK, recently passed this Bill. No alterations have been made in either House to the provisions (which were set out in the "JOURNAL" for Jan. 11, p. 80) affecting the gas undertaking.

RAMSGATE CORPORATION BILL.

This Bill was before the Local Legislation Committee of the House of Commons, presided over by Sir WILLIAM MIDDLEBROOK, on Tuesday and Wednesday of last week, and was ordered to be reported for third reading. The clause providing that the Corporation may make such reasonable charges as they may think fit when they are required by an owner or occupier of premises to read a meter index at any time other than the usual times for so doing, &c. [see "JOURNAL," Jan. 11, p. 81] has been amended, the words "not exceeding one shilling for each occasion" having been inserted after "reasonable charges."

SOUTH WALES ELECTRICAL POWER DISTRIBUTION COMPANY BILL.

Local Authorities and Capital Subscription—Objections by Gas Companies.

This Bill was considered by a Committee of the House of Commons, presided over by Captain STARKEY, on Tuesday, July 4. Its object is to reduce the capital of the Company and convert shares into stock; and it contains a clause (to which various gas companies object) which seeks to provide that local authorities authorized to supply electrical energy within the Company's area of supply may enter into agreements for a supply in bulk, and subscribe to the capital of the Company. [See "JOURNAL," March 29, p. 768, and July 5, p. 41.]

The petitioners are the Aberdare and Aberaman Consumers' Gas Company; the Brynmawr and Blaina Gas Company; the Cardiff Gas Light and Coke Company; the Garw and Ogmore Gas Company; the Gowerton Gas Company; the Llantrisant and District Gas Company; the Newport (Mon.) Gas Company; the Quaker's Yard Gas and Water Company, Ltd.; and the Rhymney and Aber Valleys Gas and Water Company.

Mr. W. E. TYLDESLEY JONES, K.C. (for the promoters), in opening, said that one of the provisions of the Bill was to enable the local authorities to whom the Electrical Company were authorized to supply electricity in bulk to subscribe to the capital of the Company. There were in the Company's area of supply a number of local authorities possessing Electric Lighting Orders, and to whom the Company gave a supply in bulk. The object of the clause in question was to enable these local authorities, instead of paying away money in the building of their own individual generating stations, to find a certain sum of money and invest it with the Company. Counsel then dealt at some length with the history of the Company, and referred to the financial difficulties of the past, which were mainly brought about by the over-optimism of those responsible for the management of the Company in the early days. The Company was incorporated in 1900, and various sub-stations had been erected, some of which were disposed of later at prices which entailed a serious financial loss to the Company. The ordinary share capital issued by the Company was £610,120. The capital was unrepresented by available assets to the extent of £457,590. Therefore they desired to reduce the capital and convert such reduced capital into stock. The amount to which the capital was to be reduced was £152,530, to be effected by the cancellation of the capital unrepresented by available assets; and this reduced capital was to be converted into ordinary stock. The Treforest Electrical Consumers' Company, Ltd., was a Company registered for the purpose of entering into an arrangement with the South Wales Company with reference to the working, maintenance, and management of the latter Company's generating station at Treforest. All the shareholders in the Treforest Company were consumers of energy supplied by the Company. Due to the co-operation of the Treforest consumers, the South Wales Company were now able to pay debenture interest, and were in sight of paying a dividend on the ordinary capital. At the present time the consumers were getting an abundant and cheap supply. With regard to supply in bulk, the various authorized distributors were desirous and willing to take a supply in bulk in most cases. But there was the difficulty that although, as local authorities authorized to supply energy in their own districts, they had power to raise money for the purpose of constructing their own works separately (which was expensive and uneconomical) they were debarred from coming into the South Wales Company's co-operative scheme, and thereby obtaining a cheap and abundant supply in bulk. There were a large number of local authorities in South Wales who could not get what they wanted, and the clause to which objection was taken was designed to give those local authorities the powers they lacked.

THE CLAUSE IN QUESTION.

(1) The council of any borough or urban or rural district who are authorized to supply energy within the Company's area of supply on the one hand and the Company and the Treforest Company, or either of them, on the other hand, may enter into and carry into effect agreements for and in relation to the supply of energy to such council, and the terms and conditions of such supply, and any such council, in pursuance of an agreement entered into under this section, may, *if they think fit*, subscribe to the capital and hold ordinary or preference shares or stock in the capital of the Company and of the Treforest Company, or either of them, and may lend money to the Company and the Treforest Company, or either of them, on the security of any

mortgage, bond, debenture, debenture stock, or prior lien debenture stock issued by them respectively:

Provided that—

(*a*) any dispute or difference that may arise between the Company and any such council as to the amount to be subscribed or lent by that council under this section, or as to the terms of any agreement authorized by this section, shall, on the application of either party, be submitted to and determined by the Electricity Commissioners, whose determination shall be final and binding on all parties;

(*b*) the amount to be subscribed or lent by any such council shall not exceed—

(i) Such sum as would be necessary for such council to expend for making provision for generating a supply of energy equal to that to be received by them under the agreement; or

(ii) The amount required to be expended by the Company to enable a supply of energy to be furnished to the council in accordance with the agreement, whichever is the larger;

(*c*) No sum shall be subscribed to the capital of, or be lent to, the Company under this section during the continuance of the working arrangement with the Treforest Company under section 3 of the Act of 1908;

(*d*) No such council shall enter into an agreement under this section to subscribe to the capital of or to lend money to either of the said companies without the consent of the Minister of Health and of the Electricity Commissioners;

(*e*) Nothing in this section shall relieve the Company of the obligations imposed upon them by the Electricity (Supply) Acts, 1882 to 1919, or the recited Acts, to supply energy to any such council upon the terms prescribed by those Acts.

(2) Any expenses incurred by a council in carrying into effect the provisions of this section shall be deemed to be expenses incurred by them under the Electric Lighting Act, 1882, and not otherwise provided for, and the provisions of sections 7 and 8 of that Act shall extend and apply to such expenses.

(3) All money received by a council under this section shall be deemed to be money received in respect of their electricity undertaking and shall be applicable accordingly.

(4) Upon payment by a local authority of a subscription under this section, or on the deposit of the amount of such subscription in a bank in the joint names of a representative of the Company and of the local authority, and the execution of an agreement as in this section provided, it shall be obligatory upon the Company forthwith to commence, and with due diligence to proceed with, the execution of the works necessary to give to the local authority the supply of electricity mentioned in the agreement, and to give and continue to give to the local authority such supply during the subsistence of the agreement, subject to, and in accordance with, the provisions of such agreement, the Electricity (Supply) Acts, 1882 to 1919, the recited Acts, and this Act.

(5) Any authorized undertakers may exercise the powers of this section notwithstanding anything in section 3 of the schedule to the Electric Lighting (Clauses) Act, 1899, as incorporated in any Order or Special Act applying to them, or any similar provisions contained in any such Order or Special Act.

Commenting on the clause, Counsel emphasized the importance of sub-clause 1(*d*). The clause as a whole had been approved by the Electricity Commissioners, the Lord Chairman of the House of Lords, the Minister of Health, and a Committee of the House of Lords, in its present form.

Mr. W. B. CLODE, K.C. (who, with Mr. RALPH BURY, appeared for the Gas Companies), pointed out that he was not saying anything about centralization. His clients believed in it as much as did the promoters.

Mr. TYLDESLEY JONES: Then why are you here?

Mr. CLODE: I will explain later.

Mr. TYLDESLEY JONES, addressing the Committee, said that every single body interested had approved the clause, and there was no opposition whatever from local authorities, ratepayers, or anybody else except the Gas Companies. Counsel then dealt with the petition of the Gas Companies. In the first place, he told the Committee that the names of some of the most important Gas Companies in the area were not there. When the Gas Companies had petitioned in the other House, there were included the Merthyr Tydfil Gas Company and the Pontypool Gas and Water Company; but these had now dropped out. Of course, he did not mean to imply that the Newport and Cardiff Companies were not important; but there were other large companies which were not represented. He instanced the Swansea Company. Another surprising thing about the petition was that the Committee would not find any local names on the back of it.

THE PETITION.

The petition stated that the petitioners were Companies supplying gas under statutory powers for lighting, heating, power, and other purposes within limits which were comprised within the area within which the Electrical Company were authorized to supply electricity; and in the case of some of the petitioners, their limits of gas supply were comprised in, or included, the limits of electricity supply of some of the councils referred to in the clause objected to. The petitioners' issued capital, including loans, amounted in the aggregate to over £1,800,000; and they were severally large ratepayers in the boroughs and urban and rural districts in which their works and mains were situated. Notwithstanding their liability as ratepayers to contribute to the rates levied in those boroughs and districts, they had no representation upon the councils, and had no voice in the election of the members. Thus, their position, in this respect, was materially different from that of other ratepayers in the boroughs and districts. The Bill would affect the petitioners injuriously by competition, and by tending to increase the amount of the local rates to which they contributed, and would depreciate the value of their respective undertakings. Therefore, they submitted that the clause in question should not be permitted to become law. The powers of the Company enabled them to supply energy in bulk to any local authority, company, body, or person authorized to give a general supply of electrical energy within the Company's area of supply, and to supply energy for providing power to any person. Energy supplied to any person could be used by such person for lighting any premises in any part of which the power was utilized. The Company had obtained Orders for the supply direct to consumers of energy for lighting within the gas limits of some of the petitioners, and might hereafter obtain other like Orders; while the industrial character of a considerable part of the Company's area of supply afforded wide opportunity for the utilization for lighting purposes of energy supplied under the powers of the Company's Act of 1900 for providing power. It was, moreover, to be observed that, however small the actual requirements of an individual consumer might be for power, advantage might be taken of the fact that a supply for power was given in order to use energy supplied by the Company to an unlimited extent for the lighting of the premises in which the power was used. The Treforest Company had for some years past exercised, on behalf of the South Wales Company, the powers of that Company for supplying electricity in an area which included the limits of supply of certain of the petitioners. The South Wales Company had, throughout their existence, suffered under very serious financial difficulties, and their condition had at all times been, and still is, most precarious, as was evidenced by the fact that, notwithstanding various financial and other expedients to which they had from time to time resorted, the issued capital of the Company, amounting to £610,120, was unrepresented by available assets to the extent of £457,590. In consequence of the financial conditions of the Company, it was proposed to reduce the ordinary capital by 75 p.ct. Neither the South Wales Company nor the Treforest Company were, as regards a large part of the Company's area of supply, at present supplying electricity to any considerable extent; and the petitioners believed that the conditions of the only areas in which the Companies were likely to secure new supplies were such that the extension of their activities would not be remunerative. The petitioners apprehended that, if the proposals of the Company should be sanctioned, and the local authorities concerned should finance the Company or the Treforest Company, the competition by those Companies, or either of them, which the petitioners might be called upon to meet would be so different in character and extent as to constitute a new competition, which would become increasingly prejudicial to the undertakings which Parliament had entrusted to the petitioners. The exercise of the powers sought by the Company would also entirely alter the character of the competition to be met by those gas companies whose limits of supply comprised or were included in the limits of electricity supply of any such authorities as were referred to in the clause, by enabling those authorities to place the electricity companies in a position to supply them in bulk with electrical energy for distribution. The clause would, in effect, constitute the companies and authorities partners for establishing or carrying on the supply of electricity in competition with the gas supplies of those petitioners, and thus subject them to injury of a novel character.

Those of the petitioners whose limits of gas supply were wholly or partly within the district of any of the authorities concerned also objected strongly to the clause in their capacity of ratepayers in those districts. The proposals of the clause were particularly inequitable, inasmuch as they would subject the petitioners, as ratepayers, to the liability to contribute towards the subsidizing of an undertaking competitive with their own, and that, having regard to the present position and future prospects of the Company and the Treforest Company, it was practically certain that any contribution by local authorities under the clause would involve the necessity of an addition to the local rates. The proposals of the clause could not even be supported on the ground that any money contributed by the local authorities would be applied solely, or even mainly, for the benefit of the electricity consumers or ratepayers in their own districts, because the limits of supply of the electrical companies were more extensive than the districts of any of the authorities.

With regard to the provision to refer disputes between the Company and any council, as to the amount to be subscribed or lent by that council, or as to the terms of any agreement, to the Electricity Commissioners, if the determination of the Commissioners were to be binding, under the latter part of the clause the provisions of the first part, relating to voluntary agreements, would appear to be quite illusory, and an element of compulsion was introduced. Any such loss or injury as the petitioners apprehended would be inflicted upon them by the clause would affect the cost of producing and supplying gas, and tend to prevent reductions which might otherwise be made in the price to the consumers, or even to cause an increase in price.

Mr. TYLDESLEY JONES, commenting on the petition, submitted that the Gas Companies were in the same position as other companies who were ratepayers, and who also had no representation on the local councils. The Great Western Railway Company, for instance, were far bigger ratepayers in some of the districts than were the petitioners; and they had not opposed. As to the capital of the Company, the £610,120 was ordinary capital. The Company were doing a sound financial thing in asking Parliament to write-down the ordinary capital. To say it was evidence of a precarious financial condition was perfectly ridiculous.

The CHAIRMAN said it had not been a very good investment.

Mr. TYLDESLEY JONES agreed, but pointed out that the Company was now run by business people, who had managed to bring it out of its bad financial position, and were now paying debenture interest; while they were also in sight of paying a dividend on the ordinary capital.

The suggestion by Mr. Tyldesley Jones that the origin of the petition was dubious, resulted in Mr. Clode's objecting to such observations unless evidence was produced to support them.

Mr. TYLDESLEY JONES asked whether the origin of the petition was known.

Mr. *Arthur Ellis* (Consulting Electrical Engineer) then gave evidence. During recent years, he said, the improvements in the position of the undertaking had been very remarkable, and it was now on the high road to success, due to the co-operative arrangement with the Treforest Company.

After an argument between Counsel on either side,

The CHAIRMAN asked whether it could be taken, for practical purposes, that the Treforest Company was a working Company.

Mr. TYLDESLEY JONES said it was not quite that. They were working another company's undertaking; but the people who, in fact, gave the supply in law were the South Wales Power Company.

Mr. CLODE, addressing the witness, said he understood the great point was that the authorized distributors were faced with the horrible alternative of putting up their own stations or subscribing to the undertaking under the clause. Were they not overlooking the fact that to-day the authorized distributors were entitled to a bulk supply from the Company?

Witness replied that they were entitled to get it under the Company's Act, and even on arbitration terms; but it did not say that the Company were in a position to give it. From the information he had, the South Wales Company had certain obligations, but, for financial reasons, could not carry them into effect. The so-called arbitration terms, on the other hand, or the terms which the Power Company would dictate, would be entirely prohibitive. Asked whether the Treforest Company were able to carry out that obligation, witness said that Company were in a different position. They were a Company of consumers operating the concern for their own businesses.

Mr. TYLDESLEY JONES said they were under no obligation.

Mr. CLODE maintained that the Treforest Company took over the undertaking of the South Wales Company, and they could not take it free from that obligation.

Replying to a number of questions by Mr. CLODE as to whether he had been asked by any single authorized distributor to be allowed to subscribe to the Treforest Company, witness said there were three schemes prepared by himself before the Electricity Commissioners which involved bulk supplies being taken under the terms of the Bill. He had a scheme at the moment in which a local authority were going to take a supply from the South Wales Power Company. This was Mynyddysllwyn; and the supply would come from Treforest. He did not know of a case in which a general power of subscription had been given to local authorities to invest in of a limited liability company.

Mr. CLODE, addressing the Committee on behalf of the petitioners, said there were very solid and substantial reasons why the powers suggested in the clause should not be given to the promoters. In the first place, he pointed out that he agreed with centralization. With regard to the prices in the second schedule of the 1900 Act, those were maximum prices, and if, under the arrangement now proposed, the Company could supply cheaper to-day, then they could supply cheaper also under the bulk supply powers of the Act of 1900. If they could supply at prices which were so far below those prices as to make it unreasonable that they should enforce them, then to-day they could do it. The Treforest works, being the works of the South Wales Company in the Treforest area, under the management of the Treforest Company, obviously the obligation which attached to the whole undertaking in 1900 still attached to so much of the Treforest undertaking as was being worked by the Treforest Company. The obligation could be enforced against them by anyone who cared to do so; and it was preserved by the very Bill now before the Committee. The Company had statutory powers to do exactly what they said they wanted to do under the present Bill, with one exception—namely, that the local authorities need not subscribe. While the obligation was still current, they introduced the provisions of the clause, which was all he was objecting to. The provisions of the clause were not only unusual and unprecedented, but they were incorporated in the Bill, and could be detached from the Bill without doing it the slightest harm. It was a perfectly simple domestic matter—merely a re-arrangement of capital. It was absolutely a new departure in municipal finance, never authorized before, because municipal authorities were to be entitled to embark ratepayers' money in the shares or securities of either a statutory company which is apparently derelict, and which has no functions to exercise except through the Treforest Company, or in securities or shares of the Consumers' Company. As to competition with the Gas Companies, he was not complaining of mere competition between gas and electricity; that would be absurd. But, for the first time, they were placing at the disposal of a rival undertaking to his own, as capital, the resources of the ratepayers and his own resources. The promoters said the ratepayers' money could be actually raised, not for the purpose of competition as the Gas Companies knew it, but for the purpose of subsidizing, and making the Gas Companies shareholders in, a rival undertaking. The present clause was a general enabling power for every authority within the area of the power Company to subscribe; that area was arbitrary. It had been chosen to allow municipal bodies in it to take advantage of the provisions of the clause; and not only were the people who are at present authorized by Provisional Order to supply energy able to take advantage of it, but whoever hereafter obtained a Provisional Order would also be entitled to take advantage of it. In five years all or any of those authorities might have obtained Provisional Orders entitling them to supply, and everyone in that area would be a potential subscriber to the undertaking. If the clause went in, Parliament would lose control of the matter. It was one of the most extraordinary features of the case, that a group of municipalities in South Wales were selected, and given, for no earthly reason, as far as he could see, except that one or two might hereafter want it, this extraordinary power. If it were right that local authorities ought to be allowed to subscribe to the Company, then there ought to be general provision by a public Act placing them all on the same level. Under the Electricity Supply Bill of 1922, which was being debated, machinery was being set up by Parliament for organizing electrical supply to do, in a much better way, the same thing as was intended by the clause, and with safety to the municipal undertakings. Therefore it was not only inexpedient, but inopportune. As to the remark which had been made that the Company's business had extended enormously, that they had an ordinary dividend in sight, and so on, if they were on the verge of a boom why not allow the Company to proceed in the ordinary and legitimate way? Why should these extraordinary powers be given to a lot of municipalities who, so far as was known, did not want them, or, if they did want them, could get them by the provisions of the 1900 Act?

No witnesses were called for the petitioners.

The Committee unanimously found the preamble of the Bill proved.

Several amendments were suggested by Mr. CLODE; but the CHAIRMAN said he thought they were going too far.

The Bill was then ordered to be reported to the House.

ELECTRICITY SUPPLY BILL.

The Question of Stand-by Clauses.

At the sitting of Standing Committee C on the 6th inst. (Sir SAMUEL ROBERTS in the chair) clause 20 was introduced for consideration. This clause is an amendment of section 15 of the Electricity Supply Act of 1909.

> Section 15 of the Electric Lighting Act 1909 (which relates to the supply of electricity to premises having a separate supply), shall have effect as if the expression "premises having a separate supply" included premises which have a separate supply of electricity or on which a separate supply of gas, steam, or other form of energy is in use or ready for use for the purposes for which electricity is demanded or received.

On the motion being made, and the question proposed that the clause stand part of the Bill,

Sir RYLAND ADKINS proposed an alternative new clause as follows:

> Notwithstanding anything in the Electricity (Supply) Acts 1882 to 1922, or in any other Act of Parliament, or any Provisional Order, or Special Order made under any such Act, a person shall not be entitled to demand, or continue to receive, for the purposes of a stand-by only from any authorized undertakers a supply of electricity for any premises having a supply (used for the purposes for which the stand-by supply of electricity is required) of gas, steam, or other form of energy unless he has agreed with the undertakers to pay to them such minimum annual sum as will give them a reasonable return on the capital expenditure incurred by them in providing such stand-by supply and will cover other standing charges incurred by them in order to meet the possible maximum demand for these premises. The sum to be so paid shall be determined, in default of agreement, by arbitration.

The CHAIRMAN suggested that there should be a voting against the clause standing as part of the Bill.

Mr. NEAL, Parliamentary Secretary to the Ministry of Transport, desired the ruling of the chair on the matter. He said there was a little difficulty in knowing how to deal with the clause, unless it could be discussed in the light of the alternative clause. His honourable and learned friend Mr. Balfour also proposed an amendment to the substituted clause—after the word "having" to insert the words "a separate supply of electricity or."

Sir RYLAND ADKINS was willing to accept the amendment. Proceeding, he said he thought the clause he had put down expressed more clearly and with greater precision what he understood to be the object of the clause and the Bill. They wanted to provide against the electric supply company being able to exact any terms that they liked, or to make any terms which were hostile to other undertakings in the case of premises in which other supplies of light and heating were used, or available for use. The Company should not be able to make a condition of their giving a stand-by supply that the others were either turned out or that the price should be most unconscionable. They did not want to be in a position where the consumers could be unduly squeezed either as to price or as to affecting injuriously the other forms of lighting or heating which might be used at the time, or which they might have made provision to use.

Mr. BALFOUR said the explanation of his honourable friend was simply this, that in the case of electricity supply given to premises having already an alternative source of supply, either by their own separate driving plant—such as a gas-engine or a supply which was already received from another undertaker—that the second source of supply should not be compelled to give an additional supply, or a stand-by supply, to these premises unless the person requiring the stand-by supply was prepared to make a complete arrangement. Having one supply, he might abuse the second supply, and practically no revenue would come to the undertaker, though the stand-by supply might involve great expense in laying mains, &c.

Mr. MACVEAGH said that the wording of clause 20 relied upon section 15 of the Electricity Lighting Act, 1909. That section was not a stand-by clause at all. It was a clause to prevent wasteful consumption. Therefore, the present clause was very badly drafted. However, all the interests concerned were agreed that there should be a stand-by clause in the Bill. If his contention was right, surely there could be no possible argument against the adoption of the alternate clause which was agreed to by all the interests concerned.

Mr. NEAL said that as clause 20 now stood, the Government had sought to protect undertakers against wasteful supply for which they got no remuneration, and they had sought to extend it in the interests of economy by providing that where the supply in existing premises was not only of electricity, but (say) of gas, then the person having his premises so equipped with gas might not demand from an electrical undertaker that he should go to the expense of putting electricity simply as a stand-by in case of breakdown of the gas supply. He did not understand why his honourable friend left out of his clause certain words which the Committee would find in clause 20, and which he thought were material in the interests of gas undertakings. The clause referred to premises "on which a separate supply of gas, steam, or other form of energy," which words were followed by "is in use or ready for use." From his clause his friend had omitted those words. Therefore he thought that the clause as it stood was a better protection than the alternative clause.

Mr. BALFOUR remarked that it was only right and proper to protect against abuse any undertaker giving a stand-by supply; and he thought it would be most convenient, in case the point was not already covered (and members were not fully satisfied that it was), if the honourable gentleman would find on report some convenient form of words to cover it.

Mr. NEAL: Certainly. This is a view which entirely coincides with my own.

The question was then put and agreed to.

RAILWAY UNDERTAKINGS AND ELECTRICITY SUPPLY.

The Committee then proceeded to consider Clause 21—the main features of which are as follows:

(1) Notwithstanding anything to the contrary contained in any special Act or Order, it shall be lawful for the owners or lessees of any railway generating station, or of any generating station erected under statutory authority for the purpose of working tramways or light railways, to supply electricity therefrom upon such terms and conditions as may be agreed—
- (*a*) to a joint electricity authority; or
- (*b*) to an authorized undertaker; or
- (*c*) to any consumer, subject, in the case of premises situate within the area of supply of an authorized undertaker, to the consent of that undertaker:

Provided that no such supply shall be given under the powers conferred by this Section—
- (i.) without the consent of the Electricity Commissioners, nor otherwise than subject to such conditions as they may impose;
- (ii.) to any authorized distributors whose undertaking is in the area of a power company, without consent of that company;
- (iii.) to any premises within the district of a joint electricity authority and not within the area of any other authorized undertakers without the consent of that authority.

Provided also that nothing contained in this Section shall limit or derogate from any powers already conferred on or exercisable by any owners or lessees of any railway generating station, or apply to any agreement already or hereafter entered into in pursuance of any such powers.

(2) The Electricity Commissioners may, subject to the provisions of the Electricity (Supply) Acts, 1882 to 1919, and of the Electric Lighting (Clauses) Act, 1899, by Order authorize the breaking-up of such roads, railways, and tramways as may be necessary for the purpose of such a supply.

Sir RYLAND ADKINS moved to leave out paragraph (*c*). He said the object of the amendment was to prevent any dealing with individual consumers who were already in the area of another undertaking, which other undertaking was in a great many cases obliged to supply electricity, gas, or whatever it might be to everyone requiring it in that area. It was surely not fair that power should be given, as was the case under this clause, to a railway company to supply superfluous electrical energy just to those particular places in their own area which they thought would be lucrative. To do this without having proper regard to the due interests of gas undertakings—most of them statutory undertakings—was really to give special benefit to the railway companies, and to countenance the principle and practice—which he hoped the Committee would say was wrong—of allowing persons acting as undertakers in matters of this kind to pick out particular plums in any area and leave those forms of supply which were not plums to be undertaken at a disadvantage by people who were under statutory obligations.

Mr. NEAL observed that he was sorry he could not meet his honourable friend in this matter. He thought clause 21 was a useful one. It provided for the case of some railway generating station, subject to very strict limits and safeguards, to supply surplus energy to be used for consumers within the area of supply of an authorized undertaker with the consent of that undertaker. There were other provisions to the effect that no such supply should be given under the powers conferred by this clause without the consent of the Electricity Commissioners, nor otherwise than subject to such conditions as they might impose, nor in the area of a power company without the consent of that company.

Mr. MACVEAGH did not agree with the Parliamentary Secretary of the Ministry of Transport. He could not find any limits at all; and the result would be that a railway or tramway company might pick out the biggest consumers and give a supply of electricity to them. This would mean that a gas undertaking would have to charge a higher price to their customers, because their best customers had been taken away from them. This was not in the public interest. The business of a railway company was transport; and in anything that affected transport he was in favour of conferring the widest possible powers upon them. But the supply of electricity was no part of the duty of a railway company; and there were strong objections to allowing other companies to come in and supply in this fashion. Of course, it might easily be in the public interest that a railway or tramway company who had a generating station should be allowed to supply to a local authority or another undertaking in bulk; but this was a different propositon from supplying direct to the consumer. This proposition ought strongly to be resisted.

Mr. NEAL: It is all with consent of the authorized undertaker.

Sir RYLAND ADKINS also submitted that the particular privilege given to undertakings who had primarily nothing to do with electricity supply should act prejudicially.

The discussion on the point was continued at some length, when

Sir RYLAND ADKINS made a suggestion. He remarked that it would be possible to put in words that the Electricity Commissioners, in giving their sanction, should have regard to the effect upon the prospective electricity supply of the area. He had also on the paper an amendment providing that the consent of the Minister of Transport should be obtained, as he thought there should be specific consent of the Minister responsible to Parliament.

The amendment was by leave withdrawn.

Sir RYLAND ADKINS then proposed that in sub-section 1 (*c*) after the word "subject," to insert the words "to the consent of the Ministry of Transport and."

Mr. NEAL said he did not see why any Government Department should step in and interfere with a consent which had been given, and which had been approved by the Electricity Commissioners, where the parties really understand and incidentally were under statutory obligations to act under the general direction of the Minister of Transport.

The amendment was rejected by seventeen votes to eight.

LEGAL INTELLIGENCE.

Liability of Householders who Fail to Give Notice on Leaving Premises.

Mr. John Atkin was summoned at the North London Police Court for non-payment of £6 9s. 4d. for gas consumed at a house during the December quarter. Defendant denied liability, stating that he gave-up possession of the premises two years ago. Mr. F. Summerfield, of the Gas Light and Coke Company, produced the contract signed by the defendant, by which he bound himself to pay for gas consumed on the premises "by himself or any other persons" until notice in writing had been given to the Company requesting them to discontinue the supply. The defendant had given no such notice; and the accounts had been submitted in his name during the last two years, and paid. The defendant said he believed he did give notice, but could not prove it. The Magistrate: I would never sign a contract like this. Mr. Summerfield: If you refused to sign, you could not get gas. The contract is in the words of the Gas-Works Clauses Act, 1847, which applies to the whole of the gas undertakings in the country. An order for the payment of the amount claimed was made.

MISCELLANEOUS NEWS.

COOKERY COMPETITIONS AND DEMONSTRATIONS AT OLYMPIA.

The "Daily Express" Woman's Exhibition is being held at Olympia from to-day (July 12) to July 29 (inclusive); and in connection therewith there have been arranged first-rate programmes of cookery demonstration lectures and popular cookery competitions with substantial money prizes.

COOKERY DEMONSTRATION LECTURES.

The cookery demonstration lectures—by well-known experts—take place daily at 3 and 5 o'clock in the Demonstration Hall, immediately inside the main entrance. Accommodation will be limited; and admission will be by invitation ticket, obtainable from the London Gas Exhibit, Stand No. 104.

POPULAR COOKERY COMPETITIONS.

The popular cookery competitions, which will also take place daily, have been arranged by the London Gas Exhibit Committee, representing the undermentioned Companies. The competitions will be held daily at 2, 4, and 6 o'clock (and on some days at 11 a.m.) in the gallery at the west end of Olympia.

There will be separate competitions as follows;

(1) FOR CHILDREN UNDER THE AGE OF FIFTEEN YEARS.

		Limited Number of Competitors.
(*a*)	Resident in the district of the Brentford Gas Company	24
(*b*)	" " " Commercial Gas Company.	24
(*c*)	" " " Croydon Gas Company	24
(*d*)	" " " Gas Light & Coke Company	96
(*e*)	" " " South Metropolitan Gas Company	48
(*f*)	" " " The South Suburban Gas Company	24
(*g*)	" " " Tottenham District Light, Heat, and Power Company	24
(*h*)	" " " Wandsworth, Wimbledon, and Epsom District Gas Company	24

Championship.—The above competitions will take place in 24 heats of 12 competitors, and the championship competition will be open to the winners in each of the 24 heats.

Prizes.—A first prize of five pounds, a second prize of two pounds, and consolation prizes of half-a-crown each to all unsuccessful competitors (to cover travelling expenses), will be awarded in respect of each of the eight district competitions by the Gas Company supplying the district.

The Marchioness of Carisbrooke has kindly offered a first prize of ten pounds to the winner of the championship competition for children. The "Daily Express" will give a second prize of five pounds, a third prize of two pounds, and seven next prizes of one pound each in respect of the children's cookery championship.

This makes a total of £114 to be awarded in prizes in the children's competition.

(2) FOR STUDENTS AT NATIONAL TRAINING SCHOOL OF COOKERY.

(Open to not more than 24 students.)

Prizes.—Lady Baring has kindly offered a first prize of five pounds, and the "Daily Express" will give a second prize of two pounds, and a third prize of one pound to be competed for by the students. Consolation prizes of half-a-crown each (to cover travelling expenses) will be given to all unsuccessful competitors.

(3) FOR WOMEN TRAINED BY THE CENTRAL COMMITTEE ON WOMEN'S TRAINING AND EMPLOYMENT.

(Open to not more than 24 candidates approved by the Committee.)

Prizes.—Lady Crewe has kindly offered a first prize of five pounds, and the "Daily Express" will give a second prize of two pounds, and a third prize of one pound to be competed for in this section.

Consolation prizes of half-a-crown each (to cover travelling expenses) will be given to all unsuccessful competitors.

(4) FOR WOMEN MEMBERS OF THE BRITISH LEGION.

(Open to not more than 24 women members of the British Legion.)

Prizes.—Lady Robertson has kindly offered a prize of five pounds, and the "Daily Express" will give a second prize of two pounds, and a third prize of one pound to be competed for in this section. Consolation prizes of half-a-crown each (to cover travelling expenses) will be given to all unsuccessful competitors.

(5) FOR HOSPITAL NURSES.

(Open to not more than 24 hospital nurses.)

Prizes.—Dame Sydney Browne, G.B.E., R.R.C., has kindly offered a first prize of five pounds, and the "Daily Express" will give a second prize of two pounds, and a third prize of one pound to be competed for in this section. Consolation prizes of half-a-crown each (to cover travelling expenses) will be given to all unsuccessful competitors.

(6) HOME CAKE-MAKING AND BAKING COMPETITION.

Open to single-handed cooks and housewives resident in the districts of the above-mentioned Gas Companies, and not engaged in baking goods for sale. The cakes submitted may be either fruit or plain, and must be about 1 lb. in weight. The judges (who will include the heads of recognized cookery schools) will have regard to lightness, texture, and perfect baking, rather than to richness of ingredients. The cakes will become the property of the London Gas Exhibit Committee and be sold for the benefit of King Edward's Hospital Fund (Hospitals of London Combined Appeal), to which the entire proceeds of the sale will be given, without deduction of any kind.

All cakes sent in for these competitions must be delivered (*via* the Hammersmith Road entrance) to the judges at the cookery competition platform in the gallery at Olympia, on Tuesday, July 25, between 9 a.m. and noon, and must be accompanied by a written declaration, signed by the competitor and a witness, to the effect that they have been prepared and cooked by the competitor unaided, by means of a domestic gas cooking-stove.

Prizes.—The Lady Mayoress has kindly offered a first prize of ten pounds, and the "Daily Express" will give a second prize of five pounds, a third prize of two pounds, and seven prizes of one pound each to be competed for in this section.

All materials required for cooking will be provided by the London Gas Exhibit Committee, except for home competitions.

All applications to take part in these competitions had to be sent to the Hon. Secretary, London Gas Exhibit Committee, No. 84, Horseferry Road, S.W. 1, not later than Friday, July 7, and had to state for which competition the candidate desired to enter, and the name of the Gas Company supplying the district in which the candidate resides.

LOW-TEMPERATURE CARBONIZATION, LTD.

The shareholders of Low Temperature Carbonization, Ltd., have received a circular from the Directors embodying a report just received from Low-Temperature Construction, Ltd.—the Company formed in March, 1921, in order to complete and operate the plant at Barnsley.

The report states that after nearly a year's trial the twenty retorts at Barnsley continue to turn out from coal slack the smokeless fuel coalite and the resultant oils, "coaline," even more efficiently than when a report was sent to the Carbonization shareholders on Nov. 3. The coalite produced has been readily sold to some 2200 customers at prices in excess of those obtained for the best domestic coal. The commercial value of this fuel has now been established by the fact that one of the leading coal distributors of the country has just signed a contract with the Company to purchase, at prices equal to those prevailing for best domestic coal, the whole of the output of coalite up to 250,000 tons per annum for the next five years.

The crude oil obtained, on investigation by chemists, is proving very valuable. The entire output of this oil from the Barnsley works has been sold at 1s. a gallon. The buyers have offered to take at this price at least 200,000 gallons, with options on much larger quantities. But in the balance-sheet the Engineers have adopted the low value of 5d. a gallon—the value set on these oils by the Government Fuel Research Board; and even at this value the balance-sheet shows a works profit of 13s. 2d. on every ton of coal carbonized.

In distillations the crude oil obtained from a ton of coal slack has yielded 10 gallons of motor spirit. In due course this country, which now imports 97 p.ct. of all the oil fuel consumed, will obtain that commodity from its own coal deposits. The patents covering this process are protected throughout the world. New and important patents have been taken out during the past twelve months, greatly strengthening the Company's position. The Government Fuel Research Board makes the very important statement that a hitherto unexpected link between the gas industry and low-temperature carbonization is likely to be established. Their report shows the great importance and value of the rich gases that can be produced by low-temperature methods, which are valued by them at 10s. per ton of coal carbonized. The Construction Company's Engineers guarantee to produce such gases. The profits of 13s. 2d. per ton are based by the Engineers from their working results, allowing nothing whatever for the sale value of the surplus gas.

The report concludes with the statement that the increasing difficulties of many collieries in disposing of their coal slack, coupled with the fact that gas companies are fast realizing that low-temperature methods will be necessary for them, have lately caused a great increase in the inquiries for plants.

The Oswestry Gas Light and Coke Company have decided to reduce the price of gas by 5d. per 1000 c.ft. as from the present meter reading.

GAS REGULATION ACT APPLICATIONS.

The following further notices have appeared in the "London Gazette" regarding applications to the Board of Trade for Orders under the Gas Regulation Act.

Kirkburton Gas Light Company, Ltd.

The standard price now authorized in respect of the supply of gas by the undertakers is 4s. 4d. per 1000 c.ft.; and the price they have asked the Board of Trade to substitute for this is 1s. 5½d. per therm.

Rhondda Urban District Council.

The maximum price now authorized in respect of the supply of gas by the undertakers is 6s. per 1000 c.ft.; and the price they have asked the Board of Trade to substitute for this is 19·2d. per therm.

The Council also ask for such modification of the minimum pressure prescribed by sub-section (2) of section 2 of the Act within certain parts of the area of supply as may appear to the Board of Trade to be necessary or expedient.

Seaham Gas and Lighting Company.

The maximum price now authorized in respect of the supply of gas by the undertakers is 3s. 6d. per 1000 c.ft.; and the price they have asked the Board of Trade to substitute for this is 14·4d. per therm.

Tipton Urban District Council.

The maximum price now authorized in respect of the supply of gas by the undertakers is 4s. per 1000 c.ft.; and the price they have asked the Board of Trade to substitute for this is 14·66d. per therm for gas applied for domestic purposes, and 13·33d. per therm for power purposes.

DECLARATIONS OF CALORIFIC POWER.

Chapel Whaley and District Gas Company.—475 B.Th.U. (Sept. 11)
Fleetwood Gas Company.—460 B.Th.U. (Sept. 18.)
Yeovil Corporation.—450 B.Th.U. (Oct. 1.)

GAS REGULATION ACT ORDERS.

We have received from the Director of Gas Administration copies of the following further Orders made by the Board of Trade under section 1 of the Gas Regulation Act.

Altrincham Gas Company.

After the declared date, the maximum price in respect of gas supplied by the undertakers shall be 13·4d. per therm.

Prepayment meter clauses are included. (July 3.)

Edenbridge and District Gas Company.

After the declared date, the standard prices in respect of gas supplied by the undertakers shall be 15·2d. and 16·4d. per therm; and these prices respectively shall be substituted for the prices of 4s. 6d. and 5s. per 1000 c.ft. mentioned in section 55 (dividend dependent on price charged) of the Edenbridge and District Gas Act, 1914.

For the purpose of ascertaining the authorized rate of dividend, any price charged per 1000 c.ft. before the declared date shall be rendered into the equivalent price per therm by dividing it by five-and-one-fifth.

Prepayment meter clauses are included. (July 7.)

Halesowen Gas Company.

After the declared date, the standard price in respect of gas supplied by the undertakers shall be 15·2d. per therm.

For the purpose of ascertaining the authorized rate of dividend, any price charged per 1000 c.ft. before the declared date shall be rendered into the equivalent price per therm by dividing it by four-and-three-tenths. (June 30.)

St. Anne's-on-the-Sea Gas Company.

After the declared date, the maximum price in respect of gas supplied by the undertakers shall be 16·4d. per therm.

Prepayment meter clauses are included. (July 7.)

Tavistock Lighting, Coal, and Coke Company, Ltd.

After the declared date, the standard price in respect of gas supplied by the undertakers shall be 14·8d. per therm.

For the purpose of ascertaining the authorized rate of dividend, any price charged per 1000 c.ft. before the declared date shall be rendered into the equivalent price per therm by dividing it by five. (July 6.)

Kenilworth Gas Company.—The report adopted at the annual meeting of the Company showed that, for the year ended March 31, after providing for all charges, there was a surplus of £1370; and the Directors recommended that the usual dividend of 5 p.ct. (less income-tax) be paid upon the "A" ordinary and "B" preference stock, carrying forward to next year's accounts the sum of £495. An increase in the number of meters and cookers fixed was reported.

Dundee Corporation Gas Accounts.—The accounts of the Dundee Gas Commissioners, for the year ended May 15 last, a copy of which has been received from Mr. Alex. Yuill (the Engineer and Manager), show that the quantity of gas delivered was 1,520,702,687 c.ft., which compares with 1,551,168,900 c.ft. in the preceding twelve months. The income of £345,388, and expenditure of £338,349, left a balance of £7039 towards meeting annuities, interest, and sinking fund charges. The deficit was £46,654, as against £24,368 a year ago. The unaccounted-for gas has been reduced from 6·32 p.ct. to 5·18 p.ct. The make of gas per ton of coal carbonized was 16,313 c.ft.; while the coke made was equivalent to 10·6 cwt. per ton of coal (exclusive of that used for firing the retorts).

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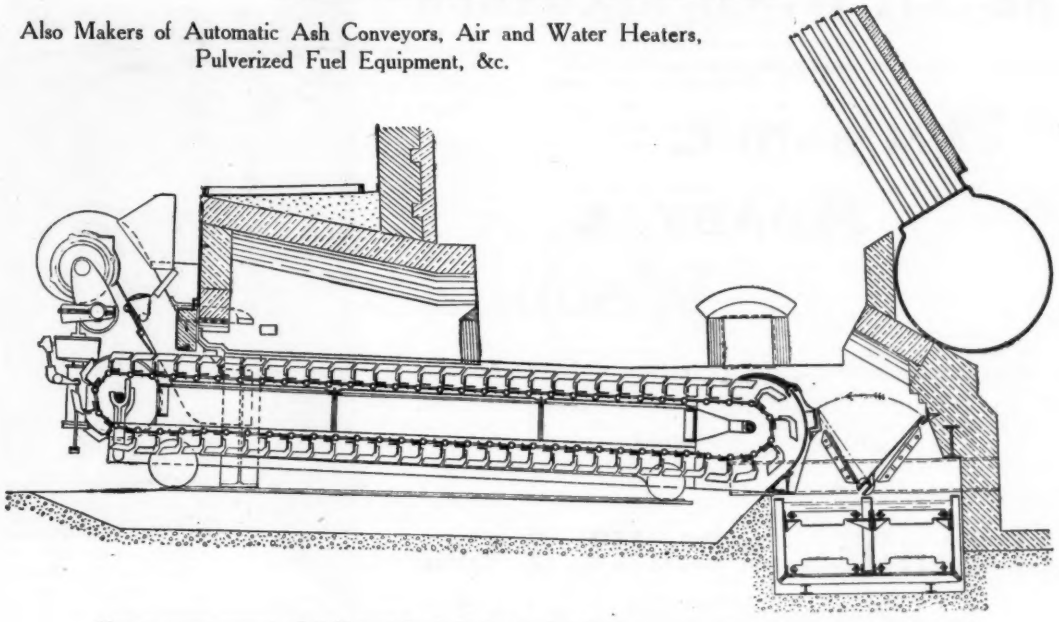

Shows arrangement of Self-contained Stoker and Ash Conveyor, where there is no basement, as at Poplar Electricity Works.

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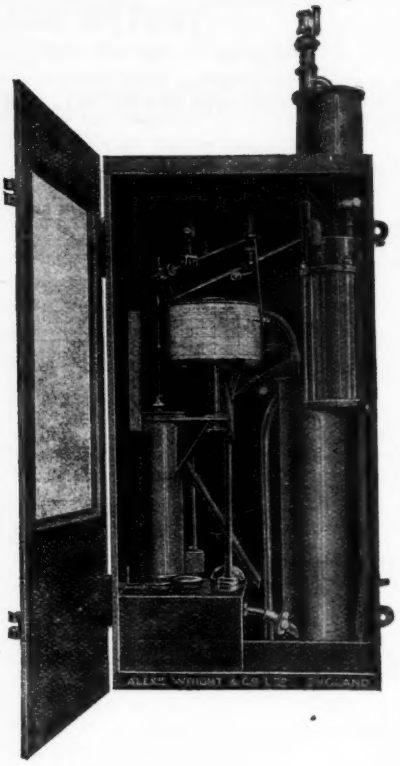

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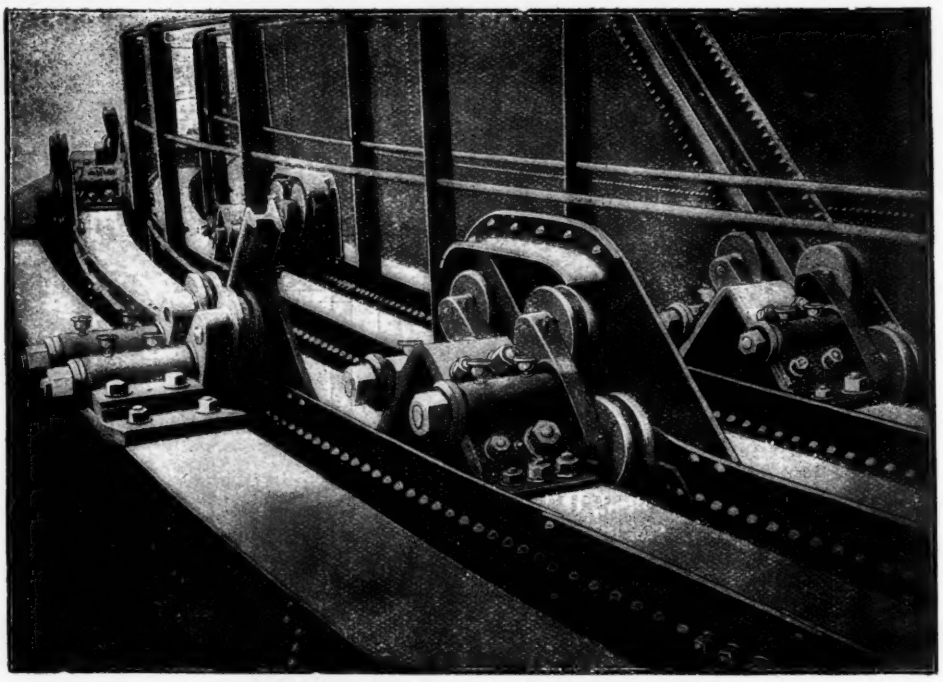

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MANCHESTER.

LIGHTING IN FACTORIES AND WORKSHOPS.

Third Report of the Departmental Committee.

In January, 1913, the Home Secretary appointed a Committee under the chairmanship of Dr. Glazebrook (now Sir Richard Glazebrook, K.C.B.), F.R.S., D.Sc., to inquire and report as to the conditions necessary for the adequate and suitable lighting (natural and artificial) of factories and workshops, having regard to the nature of the work carried on, the protection of the eyesight of the workers employed, and the various forms of illumination. In 1915, the Committee issued their first report, dealing with the general lighting of factories. Further inquiry was then postponed until after the war. In November, 1920, the Committee resumed their inquiries; and in January, 1921, Mr. C. Dampier Whetham, F.R.S., was appointed Chairman in succession to Sir Richard Glazebrook, who felt obliged to resign the chairmanship owing to pressure of other work. A second report, dealing with the suitability of artificial lighting, was issued by the Committee in June, 1921 (see "JOURNAL," Vol. CLV., p. 392). The Committee includes Mr. Leon Gaster and Sir Arthur Whitelegge, K.C.B.

In submitting their third report, the Committee say that since the submission of the previous one they have devoted their attention mainly to classification of industrial processes according to the illumination required for carrying on the work, and to an investigation of the effects of mixed natural and artificial lighting. The present report deals principally with these two subjects; and the first part is as follows.

FORMER RECOMMENDATIONS.

As our inquiries, owing to the urgent need for economy, are for the present concluded, we think it advisable to repeat here the recommendations we have already made in previous reports.

In our first report we recommended that—

1.—There should be a statutory provision—
- (*a*) requiring adequate and suitable lighting in general terms in every part of a factory or workshop, and
- (*b*) giving power to the Secretary of State to make Orders defining adequate and suitable illumination for factories and workshops or for any parts thereof, or for any processes carried on therein.

We also considered the minimum intensity of illumination desirable for the sake of general convenience and safety in parts of the workshops where work is normally carried on, and in yards, passages, and open spaces along which people are ordinarily liable to pass, and made the following recommendations:

2.—Over the "working areas" of workrooms the illumination measured on a horizontal plane at floor-level shall not be less than 0·25 foot-candle, without prejudice to the illumination required for the work itself.

3.—In all parts of iron foundries in which work is carried on, or over which any person is ordinarily liable to pass, the illumination measured on a horizontal plane at floor-level shall be not less than 0·4 foot-candle.

4.—In all parts of factories and workshops (not included under recommendation 2) over which persons employed are liable to pass, the illumination measured on a horizontal plane at floor-level shall be not less than 0·1 foot-candle.

5.—In all open places in which persons are employed during the period between one hour after sunset and one hour before sunrise, and in any dangerous parts of the regular road or way over a yard or other space forming the approach to any place of work, the illumination on a horizontal plane at ground-level shall be not less than 0·25 foot-candle.

In exceptional circumstances hardship may be caused by enforcement of the above requirements; and, to meet such cases, we recommend that—

6.—There shall be power for the Department to allow exemption in individual cases.

Finally, we recommend that—

7.—All external windows of every workroom shall be kept clean, on both the inner and outer surfaces; but in order to meet exceptional cases as below, there should be power to substitute for the above a definite and binding scheme for cleaning the windows at reasonable fixed intervals, where, for example—
- (*a*) the windows, or some of them (*e.g.*, roof windows), are not readily accessible; or
- (*b*) the total surface of external windows is exceptionally large in relation to the floor space; or
- (*c*) the conditions of work are such that compliance with the ordinary requirement is, in consequence of the nature of the work, impossible.

Finally, our first report contained several appendices in which the data obtained by us were summarized.

In view of part (*b*) of recommendation 1, we proceeded, on the resumption of our work in November, 1920, to consider the provisions which should be embodied in any Orders which may eventually be made; and, in our second report, we recommended the following provisions as necessary for ensuring suitability in artificial lighting:

(A)—Every light source (except one of low brightness*) within a distance of 100 ft. from any person employed shall be so shaded that no part of the filament, mantle, or flame is distinguishable through the shade, unless it be so placed that the angle between the line from the eye to an unshaded part of a source and a horizontal plane is not less than 20°, or, in the case of any person employed at a distance of 6 ft. or less from the source, not less than 30°.

(B)—Adequate means shall be taken, either by suitable placing or screening of the light-sources, or by some other effective method, to prevent direct reflection of the light from a smooth or polished surface into the eyes of the worker.

(C)—Adequate means shall be taken to prevent the formation of shadows which interfere with the safety or efficiency of any person employed.

(D)—No light-sources which flicker or undergo abrupt changes of candle power in such manner as to interfere with the safety or efficiency of any person employed shall be used for the illumination of a factory or workshop.

We think that all new installations should conform to these requirements; but we recommended—

(E)—That, as regards existing installations, a reasonable time limit should be given before the above requirements become operative.

ADEQUACY OF LIGHTING.

Our second report having dealt with that part of recommendation 1 (*b*) of our first report which concerns the suitability of lighting, we were left with the important problem of adequacy—how best to secure the "adequate lighting" which we have already recommended should be required by Statute and defined by Order of the Secretary of State for different industrial processes.

It is clearly impossible to specify any one standard of illumination of general application. Lighting requirements vary so much that every process in each industry must be taken into consideration.

Nevertheless, we thought it possible that most of the chief processes might be classified in a limited number of groups according to the illumination needed, and thus the whole investigation brought within manageable dimensions.

In dealing with the question of adequacy, two alternative courses of procedure present themselves—

(1)—Definite minima may be laid down, below which illumination on any part of the working plane must not fall.

(2)—Standards of illumination may be specified as recommended practice, to serve as guides in determining whether lighting is adequate.

Such standards would not be legal minima, but would conform to the best present practice, and would represent figures which may reasonably be expected for the general standard of illumination over the working plane. Till our investigation had made considerable progress, it was impossible to decide which of these alternatives to recommend.

Before deciding on minima such as those referred to in (1), it was necessary to obtain information as to the illumination required for typical processes. This information the Committee have obtained—with the assistance of the Factory Department, and in particular of Mr. John Jackson, O.B.E., H.M Deputy Chief Inspector of Factories—and it is set forth in several appendices to the report. The result of their investigations, particularly with regard to textile mills, has led the Committee to the conclusion that—

> We cannot at present recommend the enforcement of legal minima of illumination for industrial processes.

Requirements must be kept low, if they are to be enforced as legal minima. On a large working plane—such, for instance, as a broad loom—illumination must vary considerably; and points here and there may fall below a good standard without much harm, if the main area of work is well lit. On the other hand, the general standard of lighting in progressive factories has risen, and is rising. It would be unfortunate if a too rigid requirement, which, as we have said, must be put low, tended to stereotype existing conditions, or even to give an excuse for depressing general practice.

The problem is complex. Extensive investigations are necessary before it will be possible to recommend definite minima of illumination to be enfored by legislation. These, owing to the need for economy, we are unable to carry out.

We have accordingly accepted the alternative of specifying standards of illumination as "recommended practice" for "fine" and "very fine" work, rather than definite and legal minima. We now submit the following recommendations:

(A)—In giving effect to the procedure indicated in our first report for defining adequate illumination for processes carried on in factories and workshops, definite legal minima shall not at present be imposed; but a specification of minimum standards of illumination as "recommended practice" for different groups of processes shall be issued.

(B)—The Schedules A and B given in Appendix I. of this report shall be taken as the basis of this specification. The standard of illumination for processes grouped in Schedule A shall not fall below 3 foot-candles, and for processes grouped in Schedule B shall not fall below 5 foot-candles; both schedules and standards being subject to amendment from time to time.

These schedules [which are not reproduced here] cover "fine" and "very fine" work respectively.

While, with our present information, we are unable to frame definite recommendations as regards processes which need only moderate illumination, it must be remembered that, if the recommendations of our first report are adopted, the illumination at floor-level over the working areas of workrooms cannot fall below 0·25 foot-candle. This will give a considerably higher minimum illumination over the working plane, but we are well aware that this will be insufficient for many of the processes excluded from Schedules A and B.

MIXED LIGHTING.

The Committee then proceed to discuss the subject of mixed natural and artificial lighting. A room was fitted-up at the National Physical Laboratory, so that the proportion of daylight and artificial light, as

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* By "low brightness" is meant an intrinsic brilliance of not more than 5 candles per sq. in.†

† March, 1922. We now desire to add the following note:

Examples of sources of low brightness are a batswing burner, a paraffin flame, &c.; and sources of about the same brightness as these are not regarded as coming within the scope of this recommendation.

It should be remembered that the covering of a brilliant source by a very small shade (such as a silica cup covering a high-pressure gas-mantle, or a small opal globe surrounding a high-power electric source) may give this shade or globe a brightness three or four times as great as the 5 candles per sq. in.; so that it may cause considerable glare, and should consequently be treated as a source of light in itself.

well as the actual amount of each, could be carefully regulated. No conclusive results indicating any special effects of mixed lighting were obtained, however; and, owing to lack of funds, the Committee are unable at present to extend their investigation of this problem. They are therefore not prepared to make any definite recommendations on mixed lighting.

In addition to the main lines of their inquiry, the questions of the best method of lighting glass-bevelling shops, and the use of translucent instead of transparent glass in factory windows, were referred to the Committee; and these also are dealt with in the report.

Effect of Lighting on Accidents.

The Chief Inspector of Factories has supplied, for the information of the Committee, particulars of accidents investigated by the Factory Inspectors in the ordinary course of their duty, during two periods of three months, in which defects in lighting appeared to have been a contributory cause. Owing, however, to the depression in industry, the actual number of accidents has been reduced, and very few of them have been attributable to lighting conditions, as very little work has been done in artificial light. The sample, therefore, was not representative of normal times, and to quote the figures would be misleading. It should be stated, however, that the Committee were impressed by the large proportion of fatal falls through ships' hatches, due to the inadequate lighting of vessels in dock while coaling or under repair, and also by several instances in factories of accidents due to machinery in which a shadow cast upon a danger point was a contributory cause.

The Committee are of opinion that further detailed investigation of accidents over a longer period, with special reference to lighting conditions, is desirable. They feel that such an inquiry would be specially valuable as regards accidents due to "persons falling," which form a large proportion of the annual total of accidents reported to the Factory Department. The latest published return (that for 1920) shows that, of 138,702 reported accidents (1404 being fatal), 17,393 (372 fatal) were due to "persons falling," including 1175 (40 fatal) which occurred in docks.

The Committee's Conclusion.

Finally, while we hope that the adoption of the recommendations made in this report will tend to secure more adequate lighting in factories generally, we desire to point out that, in our opinion, much work still remains to be done before the regulation of factory lighting can be established on a basis of definite legal minima for illumination.

We think, indeed, that, if hardship to employers and much administrative difficulty is to be avoided, any such regulation should be preceded by a careful and systematic inquiry conducted on two main lines:

(i.) The collection, for every process concerned, of a sufficient number of observations to give some indication of the best existing practice.

(ii.) Experimental research with the object of discovering the conditions of illumination desirable on physiological and psychological grounds.

In this respect we feel that, having regard to the wide field to be covered and the complexity of the problems to be considered, little real progress can be expected so long as the whole onus of the work rests upon a single centralized Committee. In particular, the data we have been able to obtain, extensive as they are, are still incomplete in certain industries, even for the specification of advisory standards. We have, for instance, been unable to examine the important subject of the lighting of shipyards; while numerous smaller industries and processes remain to be investigated.

Ample proof is now forthcoming of the relation between lighting, on the one hand, and production and safety, on the other; and it seems to us not unreasonable to expect active co-operation on the part of all the principal industries in which lighting is specially important. We wish to suggest, therefore, that on the acceptance of this report, the principal industries specified in Appendix I. should be invited to assume partial responsibility for the scheme specified above, by arranging for the collection of the actual data, possibly through the Research Associations where they exist. These data, when properly collated by the Committee, in consultation with the industries themselves, could then be used to afford some indication of existing practice, and would form a most valuable complement to the more fundamental problem indicated in Part (ii.) of the scheme, which we suggest should remain under the immediate control of the Committee—namely, experimental research on the conditions of illumination desirable on physiological and psychological grounds.

Owing to existing economic conditions, we are precluded from dealing with these conditions at the present time; but we hope that every effort may be made to secure the continuance of our work as soon as circumstances allow.

Further Reduction at Seaford.—The Directors of the Seaford Gas Company, Ltd., announce that the price of gas is being reduced by 3d. per 1000 c.ft. as from the Midsummer meter readings. This is the second reduction since the commencement of the year, and makes 1s. in all.

Working Results at Burnley.—In his annual report, Mr. J. P. Leather, the Burnley Corporation Gas Engineer, states that, notwithstanding the coal dispute and the use of inferior coal, 13,112 c.ft. of gas were made per ton—a figure that represents a growing production for several years past. Almost 8000 fewer tons of coal were used than in the previous year. The make of gas showed an increase of 1·03 p.ct. on the year before, when there was an increase of 1·25 p.ct. Only 3·54 p.ct. was unaccounted for. Gas-making materials cost 35·48d. per 1000 c.ft. sold. The Engineer estimates the loss to the department through the coal dispute at £13,000. The net income from residuals was £41,639. Wages cost 20·43d. per 1000 c.ft., against 20·09d. Considerable expenditure has been required to bring the plant up to the pre-war state of repair; but this expenditure would be much less in succeeding years. The consumption through prepayment meters was greater than in any previous year. At the new showroom, business to the extent of £12,072 was done.

BRADFORD CORPORATION GAS REPORT.

In his report to the Gas Committee of the Bradford Corporation on the working of the department for the year ended March 31, Mr. Charles Wood (the Engineer and Manager) says that the accounts prepared by the City Treasurer show that the gross income for the year amounted to £640,776, and the expenditure to £564,230—leaving a gross profit of £76,546. The following charges had also to be met: Interest on loans, £44,278; contribution to sinking fund, £18,189; and income-tax, £13,955—leaving a profit on the year's working of £124.

Compared with the figures for the preceding year, these amounts show that the gross income is reduced by £78,593, the gross expenditure by £78,459, and the charges for interest on loans, sinking fund, and income-tax by £5439; and that the net profit is £124, as against last year's deficit of £5181. When compared with the year 1914, the gross income shows an increase of 95 p.ct., and the gross expenditure an increase of 108 p.ct. The deficit in the net revenue appropriation account has, by the transfer of the net profit, now been reduced to £8057. During the year £4700 has been spent on capital account, increasing the total expenditure on this account to £1,295,057. Of this amount, £625,627 remains outstanding; £669,430 having been provided for redemption of loans.

Sales of gas yielded £430,091, or £14,067 more than the previous year. This increase is attributable to the larger sales and the slightly higher yield per 1000 c.ft. sold. The sales of gas for the year show an increase of 39,480,000 c.ft., or 2·10 p.ct.; the yearly total being 1,913,139,000 c.ft., as compared with 1,873,659,000 c.ft. in 1921. This should be regarded as satisfactory, considering the reduced demands for industrial purposes, owing to so many works being closed, or only partially worked, during the year. The quantity of gas made was 2,094,242,000 c.ft., as compared with 2,054,231,000 c.ft., an increase of 40,011,000 c.ft., or 1·99 p.ct. The make per ton of coal has risen to the record figure of 13,991 c.ft., and the standard of quality has been substantially improved.

The markets for residuals continued to follow the depression which commenced last year; and the returns from these sources show considerable reductions. The total receipts for coke, after deducting handling and carting costs, were £103,985, or £19,702 less. The average price realized per ton was 32s. 2·89d.; and the quantity produced for sale was 64,505 tons, or 8·61 cwt. per ton of coal carbonized. The selling price was further reduced in December and January; and the present price of 30s. shows a total reduction of 12s. 6d. per ton since February, 1921. Following the Bradford custom, no coke has been sold for export; the whole of the output having been disposed of in the district. The receipts for tar show a decrease of £43,493, and are even less than during 1914. There were produced 8137 tons, or 10·60 gallons per ton of coal; and the average price realized per ton was 44s. 5·42d. The revenue from ammoniacal liquor, of which there was produced 21,722 tons, or 31·70 gallons per ton of coal, was £7128 less than last year; the average price per ton being 70s. 0·85d., a reduction of 5s. 9d. per ton. The total receipts for residuals were £71,024, or 9·465d. per 1000 c.ft. of gas sold, less than last year; and this decrease entirely nullifies the advantage derived from the lower costs of coal and decreased wages and other manufacturing charges.

On the principal items, the expenditure has been less than during the previous year. The cost of coal decreased by £46,866; the total for the quantity carbonized (including carriage and handling charges) being £254,968, against £301,834 last year. The quantity carbonized—149,684 tons—was 10,008 tons less than during the previous year, though, as already stated, the make of gas was considerably more. With the exception of the first three months of the year, abundant supplies of coal have been freely offered, and, during the closing six months, at continuously falling prices. The cost of coal, after deducting receipts from residuals, was £24,158 more than last year.

The item for repairs and maintenance of works and plant has required £99,784, or £10,035 less than last year; the prices of all classes of materials being easier. The vertical retort plants at Thornton Road and Birkshall have been kept in continuous use during the year, and are giving satisfaction in every respect. A section of the Thornton Road plant is now undergoing repairs, after working 1310 days without a break. Repairs to mains and services, which include new mains and new services, have taken £28,182, or £3645 less; and the whole of this cost has been charged to revenue account. The prices of pipes and castings now show considerable reductions.

In many of the reduced items of expenditure wages of employees are a considerable factor. During the year all classes have been affected by the agreed reductions that have operated; and it is pleasing to report that no friction whatever has arisen with the employees, either nationally or locally. The National Joint Industrial Council for the industry, in October last, agreed to the setting-up of a sliding-scale for the regulation of wages according to the Board of Trade cost of living figures, the wages of gas-workers to be adjusted quarterly; and under this scheme decreases applied from November and January. Earlier in the year agreed reductions took place in July and September. The wages of craftsmen have, of course, been regulated in accordance with the trade agreements. Wages paid during the year total £203,915, or £18,629 less than in 1921, and £115,635, or 13·7 p.ct., more than the amount paid in 1914.

The total expenditure on street lighting for the year was £67,870, or £16,440 less than in 1921; and towards this cost the Finance Committee have contributed £65,220. The net cost of the Darley Street showrooms and the appliances branch of the department was slightly higher than for last year. The showrooms continue to serve the purpose for which they were established; and the value of the publicity given to the varied uses of gas is shown in the increased demand that has been met this last year. Taken in conjunction with the increased sales of gas, the expenditure incurred in the maintenance of the showrooms is amply repaid. Similarly, the conference of the British Commercial Gas Association held in Bradford in March last was of great value to the undertaking.

Regarding the miners' dispute, Mr. Wood says: At the commencement of the stoppage we were prepared with a stock of 31,560 tons of coal, or sufficient for thirteen weeks' normal requirements; and, alone

among all the larger undertakings in the United Kingdom, we were able to maintain a full supply of gas throughout the stoppage without having to purchase any coal whatever from outside sources. We provided 6800 tons of coal for domestic use, hospitals, and food producers, which, with the large stocks of coke and breeze (10,350 tons at April 1), helped very considerably to relieve the general position in the city. The price of coke was not advanced during the shortage, as was the case in other towns. As a partial set-off to the coal provided for domestic uses, we carbonized 4200 tons of slack from the filter-beds at the Esholt Sewage Works, and in addition brought in and sold at cost price to industrial users a large quantity of the same material. The stoppage involved increased expenditure in taking coal from stock and replacing it later; but when compared with similar undertakings, which were obliged to purchase coal at very high prices, our extra costs were indeed small. It may be of interest to note that, when the miners resumed work, our stock had been reduced to the record low figure of 1284 tons.

Bradford is one of the very few places where the price of gas was not increased during 1920 and 1921; and Mr. Wood thinks that the Committee are to be congratulated upon the results of the past year's working.

The Gas Committee decided, on Friday last, to recommend a reduction of 10d. in the price of gas, bringing down the charge to 4s. per 1000 c.ft., as against 2s. 1d. pre-war. Coke prices were reduced from 30s. to 28s. 6d. per ton, or 14s. less than a year ago.

COVENTRY GAS-WORKS ACCOUNTS.

Details of the accounts for the year ended March 31 of the Coventry Corporation Gas Department—of which Mr. P. N. Langford is Engineer—were given at a meeting some days ago of the City Council.

Councillor CLEVERLEY (the Chairman of the Gas Committee), in moving the adoption of the Committee's report, said the miners' strike had occasioned the consumers practically no inconvenience, as the Committee had secured large stocks of coal and gas oil prior to April 1. The stoppage, however, cost the department £26,000 in increased working expenses. In addition, the slump in the residual market seriously depleted the revenue from this source. Having regard to these circumstances, the Committee considered the report of the year's trading very satisfactory. The gas sold totalled 1513 million c.ft., a decrease of 161 million c.ft., or 9·67 p.ct., on the previous year; but in spite of the reduction this year, the sale of gas was 43 p.ct. more than in 1914. Ordinary consumers accounted for 55·6 p.ct. of the total output. The consumption of gas through prepayment meters showed an increase of 9½ million c.ft., or 1·49 p.ct., over the previous year; while gas consumed through ordinary meters was 177 million c.ft., less a decrease of 17·4 p.ct., due to the smaller consumption for industrial purposes, caused by general trade depression. The number of consumers increased by 1765; making the total in the area of supply 34,709, of which 24,609 were prepayment. The gas-cookers fixed during the year numbered 1729; making a total in use on March 31 of 29,772. The mileage of gas-mains was now 173½. The gas made per ton of coal carbonized was 12,138 c.ft., compared with 11,780 c.ft. last year, a very satisfactory increase, particularly having regard to the inferior quality of the material purchased during the coal stoppage. The gross profit brought from revenue account was £71,129, which was £2506 more than in the previous year. The net profit for the year was £26,873, a reduction of £4644 compared with the previous year. There was a reduction of £6635 in the amount spent for new meters, stoves, public lamps, and extensions of mains. After payment for new meters, &c., there was a surplus on the year of £2985, compared with £994 last year. With the amount brought forward of £36,167, this left a total for disposal of £39,153. When the Board of Trade authorized the Council in October last to increase the price of gas, it was prescribed that no part of the surplus revenue could be transferred to the General District Fund during any year in which the price exceeded the statutory maximum of 4s. 6d. per 1000 c.ft. The Gas Committee recommended that the surplus revenue be carried forward. At the Council meeting in March, when moving the adoption of the Gas Committee's recommendation that the price of gas should then be reduced by 3d. per 1000 c.ft., he expressed the hope that it would be the first of a series of such recommendations. He was pleased to say the expectations of the Committee had been realized, and that further reductions in the cost of coal and other expenses now enabled them to recommend that a revised scale of charges should operate as from the June readings of the meters. This scale gave a reduction of 6d. per 1000 c.ft. to consumers through ordinary meters, and 5d. through prepayment meters. It would be remembered that, in order to avoid the expense of altering the mechanism of the prepayment meters, only 5½d. was added to the price of gas through these meters at the time 8d. was added to that consumed through ordinary meters. Prior to this alteration, the margin between the two was 6d. per 1000 c.ft., which represented hire of meter, cooking-stove, and extra cost of collection; and it was advisable that this difference should be again established. The scale now recommended would make the margin 5d. per 1000 c.ft. The price of gas to large consumers was substantially reduced in January last; and therefore the new scale provides on this occasion for a smaller reduction to this class of consumer. The Committee confidently anticipated further reductions in the price of coal and other expenses which, on the basis of last year's output, would enable them to recommend a further reduction in the price of gas in the near future.

The recommendations were adopted.

The Gas and Water Committee reported to the Barrow Town Council last week that the Ministry of Health had forwarded them formal sanctions to the borrowing of £15,800, £8300, and £10,400 for prospective expenditure on mains and services, meters, and stoves respectively, in connection with the gas undertaking.

GLASGOW CHEMICAL DEPARTMENT.

In his third annual report on the Glasgow Gas Committee's Chemical Works Department, Mr. W. A. Walmsley (the Manager) says satisfactory progress has been made at all the works, and considerable improvements have been effected, resulting in more efficient and economical working. A number of new plants have been started-up, and the remainder are nearing completion. Considerable difficulty has been experienced at Provan in carrying on the ordinary course of manufacturing operations while the new plant was being erected on sites already occupied by old plant. These difficulties, however, are now practically over.

During the first six months of the financial year, the prices of tar products continued to fall; and the price obtainable for sulphate of ammonia only barely covered the cost of manufacture. In addition to this, very little tar and ammonia was received from the gas-works in the first two months, owing to the coal stoppage. During the second six months prices of sulphate of ammonia and tar products improved slightly; and the department came back again to normal working.

After paying all working expenses, &c., and £17,870 for rates and taxes, and interest on the book value of the plant, the net revenue is £165,619. This figure represents £32,000 more than would have been received from the contractors on the Arbiter's figure.

PRICE OF GAS FOR POWER AT STOCKTON.

After months of persistence, the labour section of the Stockton-on-Tees Town Council have prevailed in reference to the price of gas to power consumers; and as from July 1 the charge will be 3s. 9d., 3s. 8d., 3s. 7d., and 3s. 6d. per 1000 c.ft., according to quantity, instead of 3s. 6d., 3s. 5d., 3s. 4d., and 3s. 3d. per 1000 c.ft. as previously. Last week there was a "full-dress" debate on the subject, arising out of the findings of the Gas Committee, whose recommendations were confirmed.

Alderman M'NAUGHTON (the Chairman of the Gas Committee), who was unable to attend the meeting of the Committee at which the recommendation was made, said many wild statements had been voiced. One was that domestic consumers were subsidizing power consumers; and the effect had been to cause considerable unrest in the town. There was also some anxiety among power consumers as to the ultimate price of power gas; and they were concerned as to whether it would not be better for them to go in for electricity. At the previous meeting of the Council, Mr. Kelsall had argued that it cost the ratepayers 3s. 11d. to distribute every 1000 c.ft. of gas; and that to sell the gas at any price under this was really subsidizing the purchasers at the expense of the other consumers. This, went on Alderman M'Naughton, was a plausible argument, but a dangerous one, in considering a municipal trading undertaking. If the Council were persuaded by such arguments, they would seriously imperil one of the town's greatest assets. Mr. Kelsall's basic figure of 3s. 11d. was of absolutely no use in this discussion; and the Council should ignore it. If they wanted a basic figure, what they had to arrive at was the cost of raw materials. Their Manager stated that from a ton of coal averaging 20s., he could produce 12,000 c.ft. of gas. He would get back 15s. for the coke and 3s. 6d. for the remaining residuals; so that this amount of gas could be put into the holder for 1s. 6d. The interest and redemption on the undertaking worked out at 7d. per 1000 c.ft.; but it would not be fair to charge power consumers with the whole of this. For six months of the year the greater part of the plant was idle, except for the day load; and it would be wicked to saddle the power consumers with the cost of interest and redemption for the whole undertaking during this period. In all these circumstances, he asked the Council to say that the present prices charged were on economic lines.

Mr. KELSALL remarked his figures were obtained from the Borough Accountant. He could not see how they could go to the power consumers and say: "There are certain costs which you shall not bear." Why not say to the people living near the gas-works: "You shall not be charged for mains, because you are near the works," and add something to the bills of those who lived a long distance away? A year ago they could have reduced the price of gas if they had charged an economic figure to power consumers; whereas last quarter penny-in-the-slot consumers were paying 5s. 6d. per 1000 c.ft.

Mr. BOLLANDS observed that the Gas Committee, in view of the fact that the consumption for the financial year had been less than estimated, and also because of future uncertainty, had decided that no change could be made in the price of gas for domestic uses for the next quarter. They could have reduced the price, he added, if the power consumers had had to pay the same as the poor people.

Mr. WILKINSON (the Deputy Chairman of the Committee) described the agitation as a superficial one brought about by a suspicion that capitalists were always exploiting someone. He had been making inquiries, and found that Birmingham, Manchester, and Coventry all followed the same practice as Stockton. He added that if the charges were increased, they would lose power consumers; and the domestic consumers would then have to pay more for their gas.

Mr. ALLISON said Mr. Wilkinson had discreetly left out mention of Middlesbrough in connection with his investigation, for the reason that Middlesbrough made no distinctions.

The New Gas Plant for Lytham St. Annes.—In deciding to erect a new gas plant for the borough of Lytham St. Annes, the two Urban Councils have come to the conclusion that, in order to expedite the erection of the plant so as to provide for the winter of 1923-4, and thereby effect an economy of approximately £19,000 per annum in the cost of manufacture, the Clerk be instructed to confer with the Board of Trade and the Ministry of Health, with a view to ascertaining the attitude they are likely to take in the event of an application being made for a loan, instead of waiting until the new Borough Council (under the scheme of incorporation) comes into being.

GAS EXHIBITION AT MOSSLEY.

At Mossley, on Saturday evening last, there was brought to a close a most successful six days' exhibition of gas cookers and appliances organized by the Mossley Corporation Gas Department. The case of the Committee when obtaining the support of the Town Council for the venture was that the works were not on full time; even in the winter, and that, in order to encourage customers, the utility of gas should be demonstrated. In order to emphasize the hygienic aspect of the question, Dr. C. W. Saleeby, M.D., F.R.S.(Edin.), was engaged to give his lecture on "Sunlight against Death." In the exhibition there were, besides a suite of completely furnished rooms and half-a-dozen stands displaying the labour-saving utility of every kind of gas appliance, a miniature gas-producing plant installed by the Gas Engineer (Mr. William Bennett), and other exhibits designed to show how smoke was destroyed in the production of gas. Deputations visited the exhibition from Saddleworth (which is within the Mossley gas area), Widnes, and Oldham. There were cookery demonstrations and lectures, and free afternoon teas were provided.

Alderman J. A. BOTTOMLEY, the Chairman of the Gas Committee, presided at the opening ceremony, which was performed by Sir William Kay, the Chairman of the Manchester Gas Committee.

Sir WILLIAM KAY emphasized the need for this country exercising greater economy in the utilization of everything it touched. It should be the desire of the Council to make gas cheaper to burn than coal, and there would then be no excuse for not using it.

Councillor JOHN OGDEN mentioned that in the Mossley area of supply they had something like 7000 customers, and only 2000 were using gas for purposes other than lighting. If they could persuade another 2000 to put in an appliance of some kind, their gas, he felt hopeful, would be 6d. to 9d. per 1000 c.ft. cheaper.

Dr. SALEEBY, in his lecture following the opening ceremony, said the restoration of the sunlight to our lives and our cities was the next great task of public health authorities; and he was an earnest, sincere, and life-long advocate of the gas industry for the direct reason that it was the proper way of using our national resources of coal and of preserving air and light for the inhabitants of our cities.

Alderman J. A. BOTTOMLEY, at a dinner held subsequently, gave the following short history of the Mossley gas undertaking: The Mossley Corporation gas-works originally belonged to the Stalybridge Gas Company, which was formed in 1829 to supply gas within the borough of Stalybridge and certain places in the counties of Chester and Lancaster, and in the county of York; these including Mossley, a portion of Springhead, Greenfield, Uppermill, Dobcross, Diggle, Delph, and Denshaw. The total length of mains—that was to say, main trunk mains—was 53 miles, and the variation in height was from 434 to 1005 ft. above sea level. The gas-works were taken over by the Mossley Corporation under the Stalybridge and Mossley Gas Act of 1885, and the first completed year's working was in 1887, when 71 million c.ft. of gas were sold. The mileage of mains at that time was 34. To-day the total gas made was 183 million c.ft.; the increase during the last ten years being 22 p.ct. By their Gas Acts the Corporation were entitled under certain conditions to relieve the rates from the revenue of the Gas Department; but it had not been the policy of the Committee to do this. This would be seen from the fact that during the whole period that the works had been owned by the Mossley Corporation, only £3457 has been so allotted in relief of rates. The capital expenditure on the works during this period had been £140,000. Every effort had been made to bring the works up-to-date, and to make the plant adequate for any demands that were likely to be made upon it.

SUCCESSFUL WORKING AT LISBURN.

The report just issued by the Lisburn Urban Council Gas Department shows that although the price of gas was reduced 6d. per 1000 c.ft. on Oct. 1 last, there has been a gross profit on the year's working amounting to £5316. The interest and sinking fund absorbed £4087; leaving a surplus profit of £1229, as compared with £47 for the previous year.

The Council have now decided to make a further reduction of 2s. per 1000 c.ft. (making the price 5s. per 1000 c.ft. through ordinary meters), and also allowing 10 p.ct. discount to industrial users other than lighting. They announce the fact that gas is now only 36½ p.ct. above the pre-war figure, and are hoping for a largely increased consumption.

Highly complimentary references are made to the splendid efforts of the General Manager and Engineer (Mr. A. S. Brook), and particularly to the happy position he ensured during the coal strike, throughout which period it was not found necessary to make any purchases of coal.

Kirkwall Gas-Works Sold.—The shareholders in the Kirkwall Gas Company have agreed to sell the undertaking to the Town Council at the price of £5500.

Edinburgh Gas Prices Reduced.—The Edinburgh Gas Committee have decided to reduce the price of gas by 6d. per 1000 c.ft., bringing the rate to 4s. 6d.—a reduction of 1s. 2d. in a year. For power, the proposed rate is 4s. per 1000 c.ft. The total quantity of gas manufactured during the past year shows an increase of 84 million c.ft. on the previous twelve months. On the working there is a surplus of £25,000.

Meter Hire Charges at Redcar.—Mr. Phillipson, at a meeting of the Redcar Urban District Council, moved that a recommendation of the Gas Committee that meter charges to ordinary consumers be increased 50 p.ct. should be referred back. He contended that this would be a great mistake. Moreover, the charge would be unjust and unreasonable. Consumers who had been hiring meters for thirty or forty years had bought the meters several times over. Seven voted for and seven against the amendment; and by the casting vote of the Chairman (Mr. B. O. Davies), the matter was referred back.

CHORLEY GAS-WORKS REPORT.

In his fourth annual report to the Chorley Corporation Gas Committee, Mr. Mark Newsome (the Engineer and Manager) says that the total receipts for the year ended March 31 amounted to £55,807, and the expenditure to £47,204, leaving a gross profit of £8603, as compared with £8393 a year ago. Against this sum, £10,075 has been paid for interest and sinking and depreciation fund charges, equivalent to 12·25d. per 1000 c.ft. of gas sold. Allowing for income-tax rebates obtained during the year, amounting to £1216, the result of the year's working amounts to a loss of £256. It has, however, to be remembered that much extraordinary expenditure has been incurred. Furthermore, the abnormal prices demanded for all types of fuel during the coal stoppage involved an expenditure over the normal purchases of £1956; and though the price of gas was increased, the full benefit was not obtained as affecting the past financial year, in consequence of the length of time required to alter the wheels, &c., on the automatic meters.

During the year the Committee adopted a scheme for the cash sale and hire-purchase of cookers, until then lent free of hire. The scheme was very successful, and in less than nine months a cooker suspense account has been created amounting to £1128, in addition to a revenue from simple-hire consumers of £174 in the same period. This account of £1128 is independent, and is a sum available for any future purpose. The net price of gas actually realized per 1000 c.ft. sold during the year was 4s. 8·35d., compared with 4s. 6·20d. the previous year.

The total gas produced during the year was 213,618,000 c.ft., as compared with 200,901,000 c.ft. during the previous year—an increase of 12,717,000 c.ft., equal to 5·95 p.ct. The carburetted water gas made amounted to 10,177,000 c.ft., or 4·76 p.ct. of the total gas made. The consumption for the year as indicated by the gas-rental for all purposes was 197,433,500 c.ft., as compared with 184,163,900 c.ft. last year—an increase of 13,269,600 c.ft., or 7·20 p.ct. The increased consumption for the year is very satisfactory, and far exceeds the amount anticipated. The increase is a domestic one, and is indicative of the fact that gaseous fuel for domestic work is being more appreciated, by reason of its facility, lack of waste, cleanliness, and comfort. The gas not accounted for equalled 7·34 p.ct. of the total made, as compared with 8·33 p.ct. last year.

The total quantity of coal used was 12,113½ tons. But for the prolonged coal stoppage, the results would have appeared more satisfactory. Much inferior coal was of necessity consumed, yielding poor results, though big prices were demanded for what fuel was available. Gas fuels now to be had are much more plentiful than has been the case for years; and, what is more important, the materials are cleaner and of better quality generally. The average yield of gas per ton of coal carbonized was 16,794 c.ft., as compared with 16,314 c.ft. last year, being an increase of 480 c.ft. per ton.

The daily capacity of the gas-producing plant amounts to 1,500,000 c.ft. This ignores the three beds of old horizontals which are obsolete, too expensive to work, and ready for demolishing. The figure allows for a make of 1,225,000 c.ft. from the Glover-West vertical retort installation, though it was only guaranteed to produce 1 million c.ft. During the past winter there have on many occasions been produced 980,000 c.ft. of coal gas with a 25 p.ct. margin of vertical retorts available; and when the larger retort is adopted on the remaining half of the plant, the above maximum production figure will be improved.

Residuals have yielded a very much lower return; the receipts being less than the most pessimistic would have ventured to prophesy.

SUPPLY OF GAS IN CALGARY.

Addressing the shareholders at the general meeting in London of the British Empire Trust Company, Ltd., Mr. J. Davidson (the Deputy-Chairman and Managing-Director), who presided, made the following remarks with regard to the natural gas supply to the City of Calgary.

At the last annual meeting I dealt with the history of the Canadian Western Natural Gas, Light, Heat and Power Company, Ltd., and the treatment which it had received at the hands of the City of Calgary; and I reviewed the position down to July 27, 1921, on which date we were awaiting the decision of the Public Utilities Commission of the Province of Alberta as to what rates the Company should be allowed to charge for gas. On Nov. 30, 1921, the Public Utilities Commission made an order fixing the charge of 48 c. net per 1000 c.ft. for all gas sold in the City of Calgary for domestic purposes, as compared with 35 c. previously charged by the Company. This rate was made effective from Nov. 1, 1921, and, while affording a considerable measure of relief to the Company, was far from being entirely satisfactory.

It will be remembered that it was on representations made by the City of Calgary to the Legislature of the Province of Alberta that a clause was enacted in the Public Utilities Bill of that Province, giving the City of Calgary the right to appeal to the Public Utilities Commission for arbitration as to the price which the Company should be allowed to charge for gas. I pointed out to you last year the unfairness of this legislation, inasmuch as it gave the city only, and not the Company, the right of appeal. Nevertheless, the City of Calgary, under pressure of events, did apply to the Public Utilities Commission to have the rates adjudicated, with the result that I have already stated.

You will therefore be amazed to hear that the City of Calgary has brought an action against the Canadian Western Natural Gas, Light, Heat, and Power Company, and a separate action against the Calgary Gas Company, for an order declaring the decision of the Public Utilities Commission to be null and void, and directing specific performance of an alleged obligation to sell gas at 35 c. per 1000 c.ft. in the City of Calgary, or alternatively declaring that the Canadian Western Natural Gas, Light, Heat, and Power Company have no rights to sell gas at all within the City of Calgary. You will note that the City contests the Company's right to sell gas in the City of Calgary, in spite of the

fact that the City of Calgary themselves appealed to the Public Utilities Commission to decide the price at which it was to be sold, and that for years the city has been demanding that the Company shall increase its gas supplies in order to furnish the needs of all the inhabitants. The Company having now, on the strength of the order of the Public Utilities Commission, increased its gas supply at a large expenditure, and being in course of still further increasing its supply, the city turn round and endeavour, by legal process, to have it declared that the Company have no right to sell gas in Calgary, excepting at the entirely unremunerative price of 35 c. per 1000 c.ft.

Whether successful or not, such action as that of the City of Calgary is absolutely destructive of all credit, and will be received with the strongest condemnation and most active resentment, and if persevered in to the loss of the debenture holders and shareholders, will severely reflect on the credit in London of every enterprise in Canada. No one will regret this more deeply than I do personally; for I have devoted my life to procuring the investment of British capital in Canada, and to promoting by every means in my power cordial relations and sympathy between Great Britain and the great Dominion.

TRADE NOTES.

Wellington Tube Works, Ltd.

We understand that Mr. Douglas W. Turner, late General Manager and Director of the Midland Railway Carriage and Wagon Company, Ltd., and also associated with Messrs. Cammell Laird & Co., Ltd., has been appointed Chairman of the Wellington Tube Works, Ltd., Great Bridge, Staffs. This old-established firm was started in 1872 by the late Joseph Aird, and are makers of all classes of tubes and fittings. The works have been considerably enlarged during recent years, and still further extensions are contemplated.

Fletcher-Russell Cookers.

Messrs. Fletcher, Russell, & Co., Ltd., of Warrington, forward a copy of their new gas-cooker list, No. 267. Special attention is drawn to the series of "N.T. Palatine" cookers, which has been introduced to provide cookers with spacious ovens, together with large hotplate surface. The burners on the latter are of the high efficiency type. There are new pattern back-plates and plate-racks; and many improvements have been made in details of the older patterns of cookers —particularly in the "Housewife" series, which are now supplied with open hotplate grids.

Underfeed Stoker Specialities.

There is before us a list of some of the more important recent sales of the Underfeed Stoker Company, Ltd., of Coventry House, South Place, E C. The list is as follows: For electric light and power stations: St. Helens, two travelling grates; Amsterdam, two travelling grates; Dover, two class "E"; Penarth, one class "E"; Belfast, ash conveyor; Sydney (N.S.W.), ash conveyor; and Osaka Electric Company, ash conveyor. For collieries: Lewis Merthyr, four travelling grates and ash conveyor; Great Mountain, two travelling grates and ash conveyor; Coppee Company, three travelling grates; Pentremawr, two travelling grates; and James Nimmo & Co., Glasgow, four travelling grates.

New Joint Stock Companies.—Companies recently registered include Chambers and Hammond, chemical engineers, with a capital of £15,000 in £1 shares; Incandescent Gas-Ovens, manufacturers of gas ovens or stoves, of North Street, Liverpool, with a capital of £1000; and Lumax, gas-meter manufacturers, with a capital of £20,000 in £1 shares. Regenerative Coal Gasification System, Ltd., with a capital of £300 in £1 shares (10 ordinary and 290 preference), has been registered as a private Company, with offices at No. 196, Deansgate, Manchester.

Slot-Meter Offence at Plymouth.—Lilian Masters, a charwoman, pleaded guilty at the Plymouth Police Court to charges of causing wilful damage to a slot-meter at her house, to the extent of 2s. 6d., and stealing the sum of 11s. 2d., the property of the Plymouth and Stonehouse Gas Company. A collector stated that he found the lock of the meter broken, and the money abstracted. The meter registered 2000 c.ft. of gas consumed, so there should have been 11s. 2d. in the box. Accused told the police that she broke off the lock with a pair of scissors, as she wanted the money to buy food. She was given a good character, and was bound over for six months.

Devonport Profit and Price Reduction.—Alderman J. C. Tozer, moving the adoption of the minutes of the Gas Committee at the last meeting of the Plymouth Town Council, reported with pleasure a reduction of 3d. per 1000 c.ft. in the price of gas to consumers from the Council's supply in the Devonport area, bringing the total reduction for the past nine months to 1s. In view of the profit of £16,398 made during the year, many might think that the Committee should make a further reduction in the price of gas; but for the past few years they had been working under great difficulties. Of the £16,000, it was decided to apply £10,000 for working capital, instead of borrowing, to pay off £700 to the district fund, and to carry to reserve £5000. Unless unforeseen circumstances arose, he predicted a further reduction in six months' time.

East Hull Gas Order.—The Town Clerk has reported to the Hull Corporation Parliamentary Committee that objections were lodged to the Draft Special Order of the East Hull Gas Company. Subsequent to the lodging of the objections, the Gas Company asked for an interview with representatives of the Corporation on the subject of their objections. After hearing a statement made by the Chairman of the Gas Company as to the present position and probable requirements during the next few years, it was ultimately arranged that the Company should reduce the amount of ordinary share or stock capital to £100,000, and the amount of additional loan capital to one-third of this sum. The limit of dividend on the ordinary share or stock capital is to be 7 p.ct., and the maximum rate of interest on loan capital 6½ p.ct., instead of 8 and 7½ p.ct. respectively, as was proposed.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *July* 10.

There is a strong inquiry for pitch for next season's delivery—prices indicated ranging from 75s. to 80s. per ton; but makers are not keen sellers at present. Tar for road work continues to be delivered in large quantities; and this will have a considerable effect upon the quantity of pitch available for next season's delivery. Tar spirits are quiet; pure toluole and pure benzole being about 2s. 9d. per gallon, with 95/160 solvent naphtha about 2s. 4½d. per gallon. Creosote is in good demand; the price being from 6½d. to 6¾d. per gallon net in bulk.

In other products there is nothing new to report.

Tar Products in the Provinces.

July 10.

The average values for gas-works products during last week were: Gas-works coal tar, 41s. to 46s. Pitch, East Coast, 73s. to 75s. f.o.b. West Coast—Manchester, 68s. to 70s.; Liverpool, 70s. to 72s.; Clyde, 72s. to 73s. Benzole 90 p.ct. North, 2s. to 2s. 1d.; crude 65 p.ct. at 120° C., 1s. 1½d. to 1s. 3d. naked at makers' works; 50-90 p.ct., naked, North, 2s. to 2s. 1d. Toluole, naked, North, 2s. to 2s. 3d. nominal. Coal tar crude naphtha in bulk, North, 8½d. to 9½d. Solvent naphtha, naked, North, 1s. 8d. to 1s. 10d. Heavy naphtha, North, 2s. to 2s. 1d. Creosote, in bulk, North, liquid, 5⅝d. to 5⅞d.; salty, 5½d. to 5⅝d. Scotland, 4⅞d. to 4⅝d. Heavy oils, in bulk, North, 6¼d. to 6½d. Carbolic acid, 60 p.ct., 2s. 1d. to 2s. 2d. Naphthalene, £12 to £15; salts, £5 to £5 10s., bags included. Anthracene, "A" quality, 5d. per minimum 40 p.ct. purely nominal; "B" unsaleable.

Manchester District Tar Prices.

We regret to find that the average price realized for the sale of tar in the Manchester district, according to the sliding-scale, was given by our correspondent as being £2 7s. 5·33d. per ton for the month of June. This price refers only to the month of May.

FROM A MARKET CORRESPONDENT.

Bye-Products Trade.

A further improvement appears to have taken place in most bye-products since my last report; and there is a tendency to ask higher prices. This is probably due to the fact that production is still on a small scale. Pitch continues in demand, and full prices are being paid owing to low stocks. The fact that production is still small appears to be at last having some effect upon quotations. Latest values range from 67s. 6d. to 75s. per ton; and even at the last-mentioned figure sellers are rather afraid to commit themselves lest a further upward movement should occur. Fair quantities of tar are going on to the roads; and this is causing some dissatisfaction among refiners, who complain that they are not getting their proper share of raw material. Carbolic acid has been neglected, but much more is now being extracted, as there seems a fair demand for crude 60's at 1s. 10d. per gallon. Crystal carbolic is about 5½d. per lb.; but some sellers are still asking 6d. Cresylic acid remains steady, on a moderate demand, at 2s. 3d. per gallon for pale, and 2s. for dark. Large quantities of pale cresylic acid have been sold at 2s. 4d. per gallon in bulk for export between July and December. Creosote is firmer, and 6d. per gallon is quoted. There are still ideas that there will be a shortage during the summer months. Solvent naphtha is steadier at 1s. 9d.; but naphthalenes remain quiet. Business in intermediate products continues quiet, although export interest is rather better. There are no changes in quotations.

Sulphate of Ammonia.

There is no change in the home price of sulphate of ammonia, and, at the moment, very little demand. There is, however, a steady request on export account, in spite of the uncertainty of prices in other producing countries.

A dividend of 5s. per share is being paid for last year by the Earlston (Berwickshire) Gas Company. The price of gas is reduced by 10d. per 1000 c.ft.

The Brighouse Town Council have approved a reduction in the price of gas by 6d. per 1000 c.ft., the new charge being 3s. 9d. Slot-meter consumers are given a reduction of 2¾d. in the shilling.

The Neath Town Council have appointed a deputation to visit the Ministry of Health, in order to appeal for a grant for the purpose of laying gas-mains and providing other employment for workless men.

Simple hiring of gas cooking-stoves is being resumed by the Deal and Walmer Gas and Electricity Company, who also intimate that the free installation of three modern incandescent lights, boiling-burner ring, and coin-slot gas-meter, to those not at present using gas, is now available.

During a fire which broke out at the wireworks of Messrs. Joseph Sykes Bros., of Lindley, near Huddersfield, gas from a 4-in. main caught light. Considerable damage was done to a shed and to machinery; the flames from the gas-main causing most of the injury. All is covered by insurance.

Mr. H. A. Binnie-Gray, the Hon. Secretary of the Huddersfield Rotary Club, and a member of one of the best-known Yorkshire firms of gas engineers, filled a breach at short notice last week by giving the Club an address on the construction and characteristics of a gasholder, with particular reference to the large holder at the Huddersfield Gas-Works, which his firm had constructed. He spoke of the extra precautions against the effects of gales which had to be taken in the construction of holders in exposed places, and went into details as to measurements, capacities, &c. The Mayor of Huddersfield presided. Alderman R. Mitchell (the Chairman of the Gas Committee) said, when the large holder at Huddersfield was erected, there was criticism on the score that it was too large to withstand gales; but it had withstood the most severe gales, much to the credit of the firm.

Chester Gas Company's Reduction.—The Chester United Gas Company have reduced the price of gas to 11d. per therm. The charge for large consumers has been reduced to 9·2d. per therm. The new charges are from July 1.

Barrow and the Newton Gas Supply.—In response to a request from the Dalton-in-Furness District Council, the Barrow Corporation Gas Committee offer to supply gas to the Newton area, subject to the necessary easements being obtained, and to the Dalton Council guaranteeing a return of 10 p.ct. per annum on the cost of laying the necessary mains, &c., such cost being estimated at about £600.

Ballymena Gas Undertaking.—An inquiry was held by Mr. John Bates, Inspector under the Northern Ireland Ministry of Home Affairs, into an application of the Ballymena Urban Council for a loan of £7000 to provide working capital for the gas undertaking. Evidence was given by Mr. J. M. Beaumont (the Chairman of the Urban Council), Mr. H. O'Hara (the Town Clerk), and Mr. Watson (the Gas Manager). There was no opposition.

Galashiels Gas Light Company.—After applying £4000 towards the cost of new vertical retorts, the Company show a profit for the year of £2730. A dividend of 5 p.ct., free of income-tax, is paid, leaving a balance of £630. The cost of installing the vertical retorts was £32,848; and satisfactory results are being obtained from them. The increase in gas consumption was 7,216,000 c.ft. The charge for gas is 4s. 11d. per 1000 c.ft., with a reduction of 15 p.ct. to gas-engine consumers, and of 10 p.ct. for other trade purposes.

Dublin Gas Services.—The gas services in Dublin have been hampered in some degree by the fires and explosions resulting from the recent conflicts between the Free State army and the irregular forces in revolt against the new Government; but the inconvenience arising is small as compared with that which followed on the rebellion of Easter week, 1916. There will probably be a loss of revenue by the cutting-off of supplies from several of the destroyed buildings, rebuilding of which cannot be expected for three or four years; but where merely damage by gunfire was sustained, essential requirements will doubtless be met in quick time. The interference with supplies is only sectional, and is confined to a limited area in the centre of the city.

Tipperary Gas-Works.—Owing to a dispute regarding the status of fitters and the position of some of the casual workers, the Tipperary Gas-Works have been "held" by the workers as a body since March last; but their efforts to operate the undertaking successfully have been of no avail, since many leading men have refused payment of accounts in the belief that such payments would not be honoured by the Gas Company. Faced with this situation, and with coal stocks running out, the men approached the Urban District Council to suggest that the works should be taken over by that body. The matter was discussed at some length; the Town Clerk pointing out that a transfer might be arranged under the Public Health Act. Ultimately, it was decided to defer consideration of a deal until a later stage.

Alfreton Gas Prices.—It was reported to the Alfreton Urban Council that the General Purposes Committee had discussed the application of the Gas Company to the Board of Trade to fix a maximum price per therm which would be equivalent to 7s. 2d. per 1000 c.ft. The Committee decided that, though the price was a maximum one, it was so excessive that the application must be opposed. Mr. Preston, in supporting the recommended opposition, said the present price of gas was 6s. 3d.; and he considered the consumers should have a substantial reduction. He did not think the Company had any case for suggesting the "enormous figure" of 7s. 2d. per 1000 c.ft. The Council must oppose the application in the interests of the district. Mr. Severn mentioned that the Notts and Derby Company had decided to bring the electric light to Alfreton, so at last there would be some competition for the Gas Company. The Council decided to oppose the Gas Company's application.

Buxton Gas Profits.—During a discussion in the Buxton Town Council, it was stated that the gas undertaking had made a net profit on the past year's working of over £2300; and it was strongly urged that the price of gas ought to be lowered. The Mayor (Alderman A. W. Wall, who is Chairman of the Gas Committee) said the gas-works had always been a paying proposition; and he believed the Committee intended this should continue. As soon as they had properly turned the corner after recent heavy expenditure, he assured the Council they would again reduce the price. Mr. Hall said the Committee ought to give the consumers of gas the benefit of any profits, instead of keeping to the present inflated prices. The Mayor said the consumers had a reduction in price last March, which cost the undertaking £4000. The renewals they had to make this year would be costly. They contemplated important gas-main extensions; while it was also imperative that they should put down a water-gas plant in the near future. Out of the profits, the rates had been relieved in the last eleven years to the extent of £17,000.

The Directors of Messrs. Gibbons (Dudley), Ltd., have declared interim dividends on the preference and ordinary shares of 7 p.ct. per annum, free of income-tax, for the six months ended June 30.

During the run of the Nations' Food Exhibition next September, Olympia will be packed with object-lessons in the production, distribution, preservation, and preparation of every type of food from all parts of the world. Special features will be made of machinery in motion, cookery demonstrations and competitions, processes of manufacture, &c. The offices of the Nations' Food Exhibition are at Broad Street House, London, E.C. 2.

Mr. Howson referred, at a meeting of the Clayton-le-Moors District Council, to the fact that, while there had been various reductions in the wages of the Gas Board's employees, gas still cost the ratepayers 5s. per 1000 c.ft. Four hundred millions had been taken off the wages of the workers throughout the country; and it seemed preposterous that there should be no prospect of the cost of living coming down. Mr. Cooper (the Chairman), who is a member of the Accrington District Gas Board, said they need not look for any reduction in the price of gas in the near future. The cost of recent constructional work had exceeded £120,000.

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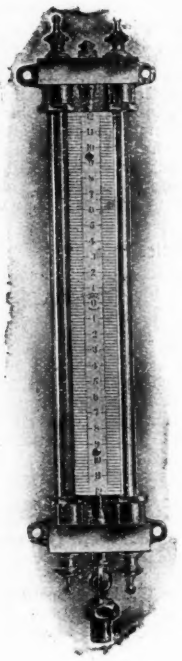

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STOCK MARKET REPORT.

THE Stock Exchange has had a disagreeable week. It opened on Monday cheerfully, and the principal markets made nice advances. But next day came a rapid change. Dullness ruled all round; and this state of things was unabated up to the close. The cause of this is attributed to the lamentable condition of foreign exchanges.

The gilt-edged market was hard hit; but the big four got through fairly well; Friday's figures being: Consols 57⅜ 58, War Loan 99⅝ 100 1/16, Funding 87⅜-87⅞, Victory 89-89⅜. Bonds were lower, and Indians had a fall.

Home Rails were sold freely; but Argentines held.

The Foreign Market was naturally weak.

Business in the Gas Market was fairly active, and again some of the minor issues came into notice. The tone generally was quite firm; but, in the gloom which reigned in most of the other markets, it could not be expected to exhibit its recent buoyancy. The London Companies hardly moved; South Metropolitan debenture gaining 2, and Gas Light ordinary losing ½. In the Suburban and Provincial group, the only noticeable incident was the return of Hastings and St. Leonards 5 p.ct. into quotations; 78-81 being the mark. In Continentals, Imperial was quoted 2 lower; but European advanced ½. Primitivas were unchanged; but San Paulo debenture rose 1.

The following transactions in gas during the week were recorded: On Monday, Alliance and Dublin 61¼, 61½. 62, Brentford debenture 77½, Commercial 4 p.ct. 93, 94½, European £12 16s. 6d., 13, Gas Light ordinary 96, 96¼, 96⅜. 97½, ditto debenture 63⅜, Hastings and St. Leonards 5 p.ct 79⅜, 80, Imperial Continental 162½, Primitiva preference 41s. 3d., 42s. 6d., San Paulo debenture 36½, South Metropolitan 96½, 97¼. ditto debenture 62⅜, Tottenham debenture 76, ditto 5 p.ct. preference 86, Liverpool 7 p.ct. preference 106½, 107, Swansea 7 p.ct. preference 102½, Swindon 5 p.ct. 51, 51½. On Tuesday, Bombay 4⅞, Brentford "A" 94, ditto "B" 94, 94⅜, Commercial 4 p.ct. 94, ditto 3½ p.ct. 93½, ditto debenture 57, Continental Union 37, ditto preference 56, Gas Light ordinary 96¼, 96⅜, 96½, 96⅝, 96⅞, 97, 97½, ditto maximum 64, ditto preference 77½, 77¾, 78, 78⅛, 78¼, 78½, 79, ditto debenture 63, 64½, ditto 10 p.ct. bonds 178, Imperial Continental 161, 161¼, 161½, Lea Bridge 86, South Metropolitan 96⅜, South Suburban 100, Tottenham debenture 77, ditto 5 p.ct. preference 90, Liverpool 7 p.ct. preference 108, Swansea 6½ p.ct. debenture 104½. On Wednesday, Alliance and Dublin 61, Brentford "A" 95, ditto "B" 95, Buenos Aires debenture 56½, Commercial debenture 58⅜, Continental Union 37, European 12⅝, 12⅝, 12⅞, 13, 13⅛, 13¼, Gas Light ordinary 96½, 96¼, 96⅜, 96⅝, 97, ditto maximum 63, 64, 64½, 65, Primitiva 178., ditto preference 40s., 40s. 7½d., 43s. 9d., ditto 1911 debenture 56, South Metropolitan 96½, 97, 97⅛, 97¼, South Suburban 100, Wandsworth 3 p.ct. debenture 58⅜, ditto 4 p ct. debenture 75, Mid Kent 148. 3d., 148. 6d. On Thursday, Brentford preference 83, European 12⅜. 12⅝, Gas Light ordinary 96, 96¼, 96⅜. 96⅝, 96⅞, ditto preference 79, Imperial Continental 161⅜, Primitiva preference 43s. 9d., South Metropolitan debenture 64, ditto 6½ p.ct. debenture 105½, 106, 106¼. Wandsworth Wimbledon 97. On Friday, European 12⅜, Gas Light ordinary 95⅜ 96, 96⅛, 96¼, 96¼, 96⅜, ditto maximum 64, ditto preference 78⅜, 79, ditto debenture 63, 63⅜, Imperial Continental 160, 161½, 161⅜, Primitiva debenture 74, South African 8⅛, South Metropolitan 96¼, 96⅜, 97, 97⅛, ditto debenture 64, ditto 6½ p.ct. debenture 106, Tottenham debenture 76, Wandsworth "B" 98, ditto 3 p.ct. debenture 58½, Swansea 7 p.ct. preference 102 5/16, Redbill 5 p.ct. "B" 64, 65.

In the Money Market, the position was one of marked ease; rates becoming at last almost nominal. Discount terms relaxed moderately. Silver varied slightly above and below 36d. The Bank rate is 3½ p.ct., as fixed on June 15.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S TRANSACTIONS.

Issue.	Share.	When ex-Dividend.	Ante-War Dividend & Bonus.	Last Dividend.	NAME.	Closing Prices, July 30, 1914.	Present Prices.	Lowest and Highest Prices of Transactions.
£			p.c.					
182,049	Stk.	Mch. 15	4	4%	Aldershot 4 p.c. Pref.	..	70—75	...
1,551,868	,,	Apl. 12	2½	3 5/16%	Alliance & Dublin Ord.	59—64	60—65	61—62
374,000	,,	Jan. 12	4	4%	Do. 4 p.c. Deb.	76—79	62—67	...
280,000	5	May 18	7½	4/-	Bombay, Ltd.	5⅛—6⅛	4⅛—5	4⅛
100,000	5	Feb. 23	16	7½%	Bournemouth Gas and Water: 5 p.c.	..	10½—11½	...
383,110	10	,,	7	7%	Bournemouth Gas and Water: B 7 p.c.	15—15½	9—10	...
115,000	10	,,	6	6%	Bournemouth Gas and Water: Pref. 6 p.c.	13½—14	8—9	...
162,065	—	June 29	—	4%	Bournemouth Gas and Water: 4 p.c. Deb.	..	63—68*	...
992,045	Stk.	Feb. 9	14	56/-	Brentford A Consolid.	261—266	90—93	94—95
734,920	,,	,,	11	55/-	Do. B New	204—209	9>—95	94—95
55,000	,,	,,	5	5%	Do. 5 p.c. Pref.	109—111	80—85	83
221,400	,,	June 15	4	4%	Do. 4 p.c. Deb.	91—93	73—78	77½
214,775	,,	Mch. 15	11	11%	Brighton & Hove Orig.	208—213	165—170	...
244,200	,,	,,	8	8%	Do. A Ord. Stk.	154—159	118—123	...
1,287,500	Stk.	July 28	5	5%	Bristol 5 p.c. max.	..	..	...
530,000	20	Mch. 15	12½	10%	British	44—45	29—31	...
120,000	Stk.	June 29	4	4%	Do. 4 p.c. Deb. Stk.	88—90	76—80*	...
245,771	,,	,,	4	4%	Buenos Aires 4 p.c. Deb.	85—87	53—58*	56½
100,000	10	June 1	—	7%	Cape Town & Dis., Ltd.	1½—2½	6½—7½	...
100,000	10	Apl. 27	—	4½%	Do. 4½ p.c. Pref.	4—6	6½—7½	...
100,000	Stk.	June 29	4½	4½%	Do. 4½ p.c. Deb. Stk.	70—75	73—78*	...
157,150	,,	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	..	...
1,513,280	,,	Mch. 15	5/9/4	42/8	Commercial 4 p.c. Stk.	106—108	91—96	93—94
560,000	,,	,,	5½	38/4	Do. 3½ p.c. do.	103—105	92—97	93½
475,000	,,	June 15	3	3%	Do. 3 p.c. Deb. Stk.	69½—71½	55—60	57—5*8½
800,000	,,	Dec. 15	4	—	Continental Union, Ltd.	76—79	37—42	37
200,000	,,	,,	7	—	Do. 7 p.c. Pref.	115—118	55—60	56
51,600	,,	Feb. 23	15	15%	Croydon A 10 p.c.	..	200—210	...
278,400	—	,,	12	12%	Croydon B and C 7 p.c.	..	160—170	...
492,270	Stk.	—	6	4½%	Derby Con. Stk.	123—125	80	...
55,000	,,	—	4	4%	Do. Deb. Stk.	102—104	65	...
1,002,180	10	Jan. 26	10	5%	European, Ltd.	17½—18	12½—13½	12⅝—13
16,298,975	Stk.	Feb. 23	1/17/4	46/8	Gas Light and Coke: 4 p.c. Ord	98—102	96—98	96—97⅛
2,600,000	,,	,,	3½	35/-	Gas Light and Coke: 3½ p.c. max.	76—79	64—67	63—65
4,062,235	,,	,,	4	4%	Gas Light and Coke: 4 p.c. Con. Pref.	96—99	77—81	77½—79
4,674,850	,,	June 15	3	3%	Gas Light and Coke: 3 p.c. Con. Deb.	72½—74½	61—64	63—64⅛
130,000	,,	Dec. 11	10	10%	Gas Light and Coke: 10 p.c. Bonds	..	..	178
82,500	,,	Sept. 14	5	3½%	Hastings & St. L. 5 p.c.	..	78—81	70½—80
258,740	,,	Mch. 15	3½	2½%	Do. 3½ p.c.	87—89	60—63	...
70,000	10	May 18	11	5%	Hongkong & China, Ltd.	16¼—16½	6—7	...
86,600	Stk.	Mch. 15	9	9½%	Hornsey 7 p.c.	..	115—120	...
131,000	,,	,,	7½	7½%	Ilford A and C	151—154	120—130	...
65,780	,,	,,	6½	5½%	Do. B.	115—118	100—110	...
65,500	,,	June 29	4	4%	Do. 4 p.c. Deb.	92—94	73—78*	...
1,976,000	,,	May 18	9	5%	Imperial Continental	150—160	160—165	160—162½
404,800	,,	Feb. 9	3½	3½%	Do. 3½ p.c. Deb. Red.	84—86	74—79	...
235,242	,,	Mch. 15	6½	6½%	Lea Bridge Ord. 5 p.c.	119—121	83—88	86
2,498,905	,,	Feb. 26	10	37/6	Liverpool 5 p.c. Ord. A.	211—213	..	...
					Liverpool 5 p.c. Ord. B.	146—148	..	...
306,083	,,	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	..	..	...
165,736	,,	Feb. 23	7/5/6	6%	Maidstone 5 p.c.	..	87—92	...
63,480	,,	June 29	—	3%	Do. 3 p.c. Deb	..	47—50*	...
75,000	5	,,	6	6%	Malta & Mediterranean Met. of Melbourne: 4½ p.c. Deb.	4⅛—4½	3⅛—3½*	...
250,000	100	Apl. 3	4½	4½%	Monte Video, Ltd.	99—101	91—98	...
541,920	Stk.	June 1	4	4%	Newcastle & Gatsh'dCon.	11½—12	63—68	...
1,875,892	,,	Feb. 23	4½	4½%	Do. 3½ p.c. Deb.	98½—99½	8⅛—8½	...
529,705	,,	June 29	3½	3½%	North Middlesex 10 p.c.	82—83	66—70*	...
15,000	10	Aug. 26	—	7/6	,, ,, 7 p.c.	..	12½—13	...
55,940	10	Mch. 15	7/14/0	10/1⅛	Oriental, Ltd.	14—15	10½—1 1/8	...
300,000	Stk.	May 18	8	8%	Ottoman, Ltd.	117—122	92—97	...
60,000	5	—	10	—	Plym'th & Stonh'se 5 p.c.	7⅛—7½	2—3	...
188,120	Stk.	June 29	—	6/3/9%	Portsea Island, B	..	93—98*	...
60,000	50	Mch. 15	13	62/6	Do. C	128—131	87—90	...
100,000	50	,,	12	57/6	Primitiva Ord.	118—121	78—83	...
249,980	5	—	8	—	Do. 5 p.c. Pref.	5⅛—6	1/8—¼	17/-
499,960	5	—	5	—	Do. 4 p.c. Deb.	4⅛—5	2—2½	40/—43/9
521,600	100	June 1	4	4%	Do. ,, ,, 1911	91—93	74—76	74
600,009	Stk.	Jan. 26	4	4%	River Plate 4 p.c. Deb.	..	55—60	56
346,198	,,	June 29	4	4%	San Paulo: 6 p.c. Pref.	85—87	53—58*	...
150,000	10	Mch. 30	6	6/-	San Paulo: 5 p.c. Deb.	10½—11	5⅛—6⅛	...
125,000	50	July 3	5	5%	Sheffield A	47—49	35—38*	36½
135,000	Stk.	Mch. 15	10	5%	Do. B	223—224	93—95	...
209,984	,,	,,	10	5%	Do. C	222—224	93—95	...
523,500	,,	,,	10	5%	Shrewsbury 5 p.c.	220—222	93—95	...
133,201	Stk.	Sept. 15	4	4%	South African	..	..	...
90,000	10	June 29	9	7½%	South Met. Ord.	10⅛—11⅛	7—9*	8⅛
6,609,895	Stk.	Feb. 9	5/4/0	5%	Do. Red. Pref.	111—113	96—99	96½—97⅛
250,000	,,	Jan. 12	—	5%	Do. 3 p.c. Deb.	..	96—98	...
1,895,445	,,	,,	3	3%	South Shields Con. Stk.	72½—74½	62—65	62⅝—64
224,820	,,	Feb. 23	8½	8½%	S'th Suburb'n Ord. 5 p.c.	157—159	10 >—111	...
1,087,795	,,	,,	6	3½%	Do. 5 p.c. Deb. Stk.	114—116	98—103	100
368,837	,,	June 15	5	5%	Southampton Ord.	116—118	93—98	...
647,740	,,	May 18	5	5%	Do. 4 p.c. Deb. Stk.	99—102	70—75	...
121,275	,,	June 29	4	4%	Tottenham District: A 5 p.c.	..	63—68*	...
120,000	,,	Feb. 23	—	7½%	Tottenham District: B 3½ p.c.	135—138	112—117	...
782,275	,,	,,	6	5½%	Tottenham District: 4 p.c. Deb.	115—117	98—103	...
181,255	,,	June 15	4	4%	Tuscan, Ltd.	87—89	75—80	76—77
182,380	10	Dec. 30	5	—	Do. 5 p.c. Deb. Red.	5—6	1—2	...
149,900	10	July 1	5	5%	Tynemouth 5 p.c. max.	93—95	45—50	...
236,476	Stk.	Mch. 15	5	3½%	Wandsworth, Wimbledon, and Epsom—Wandsworth A 5 p.c.	108½—109	71—73	...
30,000	,,	Mch. 15	8½	66/3	Do. B 3½ p.c.	151—156	110—115	...
255,636	,,	,,	6½	51/3	Do. C.	129—134	95—100	98
108,075	,,	,,	—	46/4½	New Ordinary	..	85—90	...
140,865	,,	,,	—	46/4½	Wimbledon 5 p.c.	..	85—90	...
352,000	,,	,,	6½	45/-	Epsom 5 p.c.	117—122	92—97	97
98,000	,,	,,	6½	50/-	3 p.c Deb. Stk.	121—126	95—100	..
88,416	,,	June 29	3	3%		66—69	57—60*	58½—58½

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EXPERIENCED Engineer required by Old-Established Firm in North Midlands manufacturing Gas-Meters, Burners, and Fittings. Must be energetic, have thorough knowledge of the Trade, and be fully Experienced in up-to-date Methods of Production.
Write, in confidence, with Particulars of Age, Experience, and Salary required, to No. 7177, "GAS JOURNAL," 11, BOLT COURT, FLEET STREET, E.C. 4.

FOREMAN wanted for Mechanical Department at the Croydon Gas-Works, must have up-to-date Experience of General Shop Work, and Repair and Maintenance of Machinery, knowledge of Electrical and Compressed Air Stoking Machinery and other Gas-Works Plant. Good Organizer and Controller of Men. Good Salary for the right man. Free House, Coal, and Gas.
Apply, stating Age, Experience, and all particulars to the undersigned.

A. CADDICK,
Engineer.

Gas-Works,
Waddon,
Croydon.

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H. MITCHELL, FOR PATENT SLOT METER PAD & OTHER LOCKS. KENTISH TOWN, N.W. MANCHESTER.